



# MODEL Airplane NEWS

**25 HOT  
HOLIDAY  
PICKS** p. 32



**FIRST LOOK!**  
Thunder Tiger  
Rare Bear

**Budget Computer  
Control** HITEC'S NEW OPTIC 6



**FLY BETTER!**  
**12** SIMPLE  
SETUP TIPS

WE TEST

The World Models Spitfire > Giant-scale warbird  
Kangke Rearwin Speedster > Quick-build classic  
Seagull Zero > .40-size Rising Sun fighter  
Balsa USA Fokker Triplane > All-wood kit



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DECEMBER 2004





# MODEL Airplane NEWS

DECEMBER 2004, VOLUME 132, NUMBER 12

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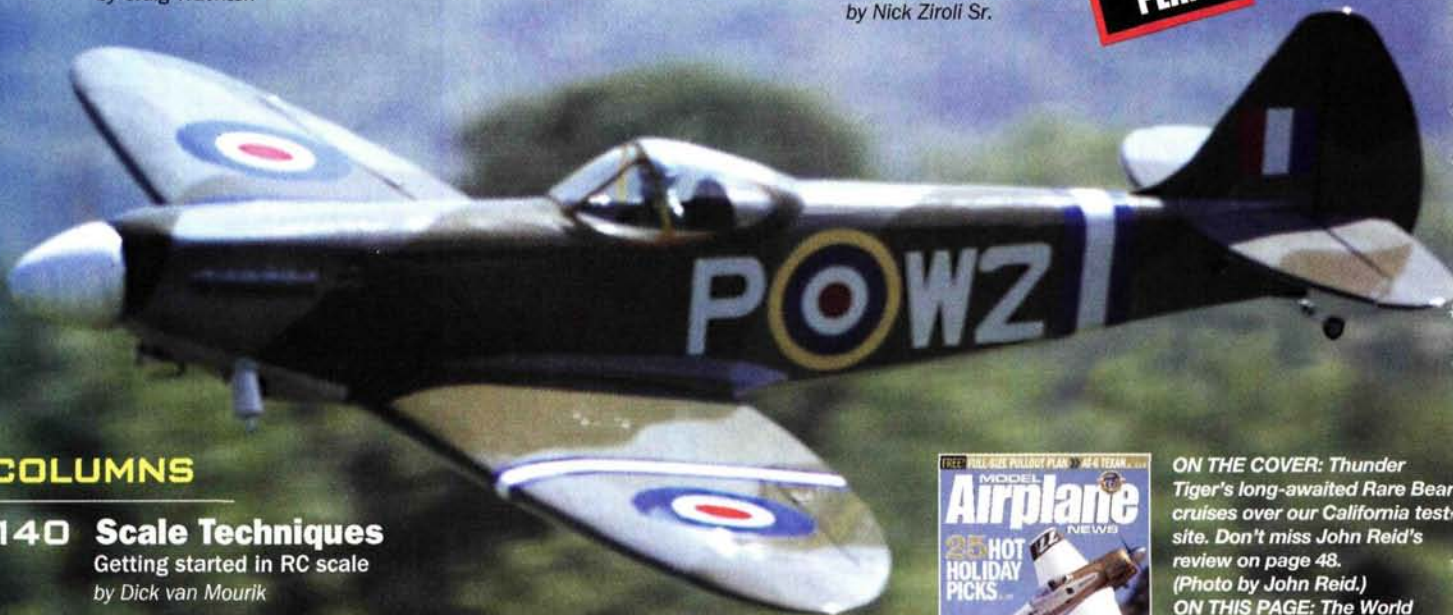
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**FREE!  
PULLOUT  
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**ON THE COVER:** Thunder Tiger's long-awaited Rare Bear cruises over our California test site. Don't miss John Reid's review on page 48. (Photo by John Reid.)  
**ON THIS PAGE:** The World Models' Spitfire beautifully replicates one of WW II's most honored aircraft. See page 64 for Stan Kulesa's review. (Photo by Pete Hall.)

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## EDITORIAL

BY DEBRA CLEGHORN



## A VISIT FROM ST. NICK

Happy holidays! To celebrate the season, we have a special gift for our readers: a full-size, pullout AT-6 plan by Nick Zirola Sr. (who certainly qualifies as a patron saint of RC!). Powered by a Speed 400 motor or a brushless unit, Nick's 20-inch-span Texan likes to fly fast, although it's right at home rounding the bases at a softball field. After you've built your T-6, be sure to send us a photo and brief description of its scheme; in return, we'll send you another gift—a *Model Airplane News* T-shirt! If you need more incentive, we'll also feature our favorite Texans in an upcoming issue and online. So go ahead and build one; we know you want to!

### SEE IT HERE FIRST!

Two brand-new review items in this issue deserve special mention. The first—and most obvious!—is our cover plane: the much-anticipated Thunder Tiger Rare Bear. West Coast associate editor John Reid pulled out all the stops to assemble and fly this Reno racer so you wouldn't have to wait a day longer to read about it. Did this plane live up to our very high expectations? Turn to page 48 and see!

We also have an in-depth review of the just-released Hitec Optic 6—an affordable, 6-channel radio with eight-model memory. The Optic 6 is also compatible with Hitec's Spectra module for the ultimate in frequency freedom. See senior tech editor Gerry Yarrish's review on page 124.

### IN THE WORKSHOP

It's a sure bet that any airplane will fly better if you first take the time to set it up properly on the ground, and that's why you must not miss associate editor Rick Bell's "Preflight Setup" how-to this month. See page 84 for the simple steps you can take to ensure that your model is perfectly aligned and ready for flight.

This month, we also welcome electrics expert Greg Covey to the hangar of *Model Airplane News* authors. Greg was impressed by the clean, sleek lines of the Great Planes Little Toni, so he decided to convert this ARF to quiet electric power. His successful power swap was easier than you might think; see his how-to on page 134.

Safe landings!

*Debra Cleghorn*

Debra Cleghorn  
Executive Editor



## JOIN OUR TEAM!

Do you enjoy your job as much as you enjoy your hobby? If you don't, put your passion for modeling to work by joining our editorial team! Owing to our successful and expanding line of RC publications, we're looking for a creative, organized, quality-driven individual to work on *Model Airplane News*, *Backyard Flyer* and *RC MicroFlight*. This full-time, Connecticut-based position requires writing and editing experience and, ideally, significant knowledge of the RC hobby. You must be able to work under deadline pressure and thrive in a results-oriented team environment.

We offer a competitive salary and excellent benefits, including a 401(K) plan. Send cover letter, resume and salary requirements to: Director, Human Resources, Air Age Media, 100 East Ridge, Ridgefield, CT 06877-4606 USA; fax (203) 894-3694; email [resumes@airage.com](mailto:resumes@airage.com).



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### ON THE EDGE

I look forward to reading *Model Airplane News* each month. I generally read it from front to back, but I opened the November issue directly to the review of the giant-scale Edge 540 from Hangar 9. This is the plane I have been waiting to buy, and your review could not have come at a better time! I have a couple of questions, though. It looks like a great plane, but does it really fly as well as the author says it does? What does he mean when he says, "I couldn't get the plane to stall or snap at slow speeds (which is unheard of for a plane of this type)."? Is the author saying that the plane can't do a snap roll? If so, how can it be an aerobatic plane if it doesn't do a snap roll? Any information you can give me will be greatly appreciated. Thanks for a great magazine.

Josh Richling  
Apple Valley, CA

Josh, I'm glad to hear that you read our magazine from cover to cover; it's good to know that people enjoy our efforts. I have been flying the Edge 540 since we reviewed it, and I am still extremely happy with its performance and aerobatic capabilities. It is an outstanding value and a great plane to introduce anyone to the world of giant-scale, 3D aerobatics. I can assure you that with the correct stick input, the plane does outstanding snap rolls. My comments about a plane stalling or snapping at slow speeds referred to how the plane handled when I slowed it down to begin the transition from normal flight to high alpha (3D) flight. A good plane (like the Edge 540) will maintain stable flight performance throughout the transition and won't exhibit any stall or snapping characteristics (such as one of its wings dropping). A plane that won't stall or snap out at slow speed gives the pilot a lot more confidence to practice close to the ground. Hangar 9's



Edge 540 provides that type of flight stability and confidence. You won't be disappointed! JR

# TECHNOLOGY



## T-REX

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Build large and enjoy effortless flying with our 85" Sport Trainer. Fly with confidence and superior control. Experience the benefits of a fully-sheeted wing: strength, agility and amazing control. A truly versatile kit, providing accuracy and performance through serious technology.

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Weight ..... ~7lbs	Radio Channels ..... 4-5

# MEETS THE CLASSIC



1/5 Scale

## Tri-Pacer

See and feel the difference thoughtful engineering makes! This kit is designed for superior strength and performance, with precision, laser-cut parts, and a clear, highly appealing manual showing the respect MosquitoBite Planes has for the discerning modeler. Smooth building, smooth flying — a real joy to build.

Tri-Pacer Specs:	
Wingspan ..... 72"	2-St Engine ..... 46-60
Length ..... 51.5"	4-St Engine ..... 60-80
Weight ..... ~7lbs	Radio Channels ..... 4-5



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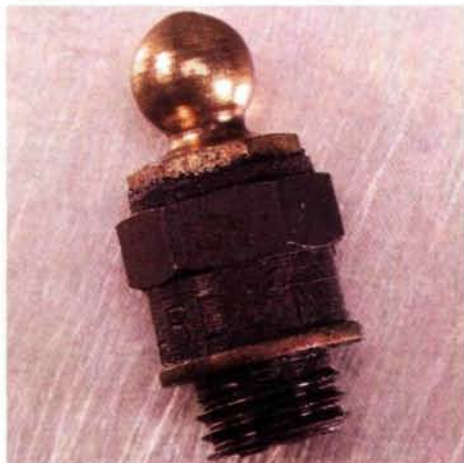
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#### ARDEN'S INSPIRATION

Dave Gierke's "Glow Plugs Exposed" articles (in the August and September 2004 issues) were outstanding, and his "History of the Glow Plug" was of special interest to me. To complete the rest of the story, it should be mentioned that Ray Arden was initially inspired to make small engines by Augustus M. Herring, as documented by model historian Louis H. Hertz in his "The Complete Book of Model Aircraft, Spacecraft and Rockets," published in 1967.

Herring was apparently quite a character, but he deserves credit for encouraging the young Ray Arden!

Bill Hannan  
[email]



#### BITTEN BY THE BIPLANE BUG

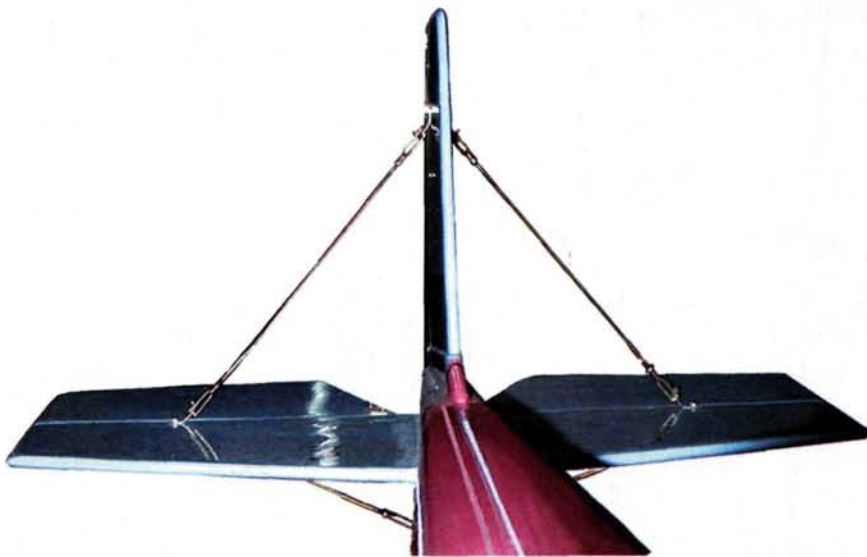
Thank you for providing such a wonderful magazine for all of us fliers—great job! I'd like to ask you for some advice about my next plane. I've been bitten by the biplane bug, and I would like to know which biplane you recommend. I want a WW I model—something like a Fokker D.VII or an S.E.5a, but nothing as difficult to handle as an Ultimate or a Pitts. I also want a plane that's IMAA-legal, so I can enter my model in a big-bird fly-in. I have a well-broken-in Saito .91 to hang on to. I think that a 60- to

68-inch-wingspan would be about right. The Flair D.VII and Fun Aero S.E.5a seem to be the best candidates so far. I enjoy building, so I would enjoy a kit more than an ARF. Any suggestions would be appreciated; I've been a subscriber for many years and value your reviews and opinions. Thanks, and keep up the good work!

Daniel Edwards  
Topeka, KS

*Daniel, I have to confess that I, too, am infected with the biplane bug; the only way to treat this ailment is to go out and build a favorite biplane, then*

# High Strung.



## The S546 Flying Wire Kit

This kit is specified by major kit manufacturers for a reason: It is the most complete Flying Wire/Tail Brace Wire kit you can buy. It contains eight feet of *both* .032" Stainless Steel Cable and Heavy Duty Kevlar®. It has Gold-N-Clevises, eyebolts, crimp sleeves, nuts, Steel Brackets, couplers -- everything needed for a complete circuit around the tail or between wings in any of a dozen variations.

The kit is easy to install and adjust, whether you use the lightweight, nonconductive Kevlar® or the multistrand Cable.



Features special **Steel Attachment Brackets**. They can be bent as needed, will accept clevises in the small holes, or wire or Kevlar® loops through the brass bushing. (Available separately as S547).

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### GETTING BETTER IDEAS OFF THE GROUND

*another, and another, and .... Anyway—yes, the two kits that you mentioned are good choices, and I think you would be very pleased with either one. Fun Aero has two, 60-inch Albatros kits (a D.II and a D.III) that are also ideal for a .90 engine. Another good choice would be the DynaFlite 1/5-scale S.E.5a that can accommodate a .61 to 1.20 engine, so your .90 would be just fine! With a wingspan of 64 inches and a wing area of 1,440 square inches, the 12- to 13-pound S.E.5a would be a great project. So take your pick; there are several good WW I kits out there. Find one that turns your crank, and break out the glue. Good luck! GY ♣*



## TIPS & TRICKS

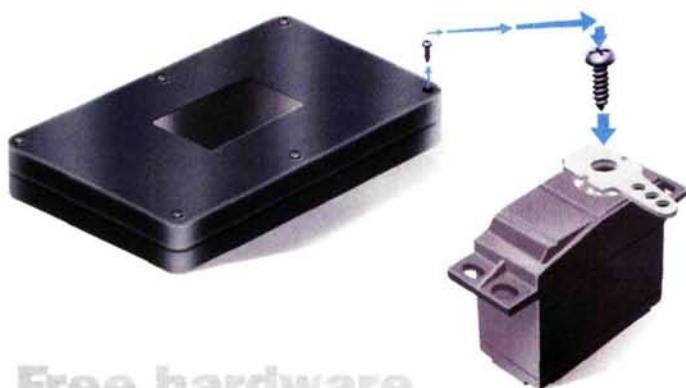
Illustrations by Richard Thompson

**SEND IN YOUR IDEAS.** *Model Airplane News* will give a free, one-year subscription (or a one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE THAT YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.

### You bet your booties

Commercially available hot-sock covers for covering irons work great, but they can be rather costly. An inexpensive alternative is to use cotton baby socks. Socks sized 0 to 6 months will fit almost all covering irons, and they're available in any department store. Buy socks with the highest cotton content you can find; 85 percent and higher works great. A package of six pairs of socks will yield 12 iron covers at an average cost of 32 cents per sock.

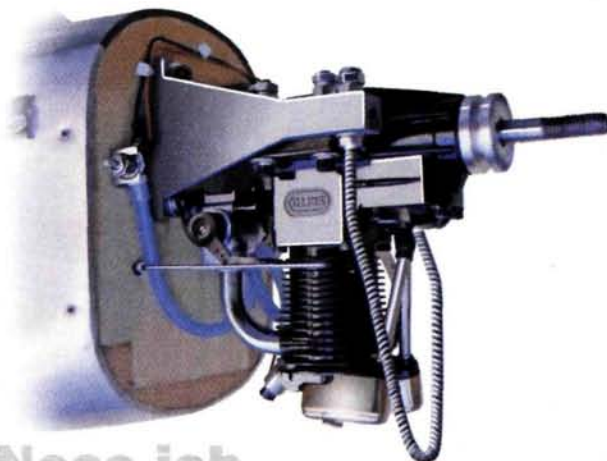
Dick Babisch, Shelby Twp., MI



### Free hardware

How many times have you lost or misplaced a servo control-arm screw? Probably more than once. If you replace the lost screw with those from spare servos, you'll soon run out of screws. Most of us have VHS tapes that are damaged and no longer usable. The case halves of the tapes are held together with screws that make excellent replacements for lost screws. The screws may be of different sizes and lengths, so check them before you use them.

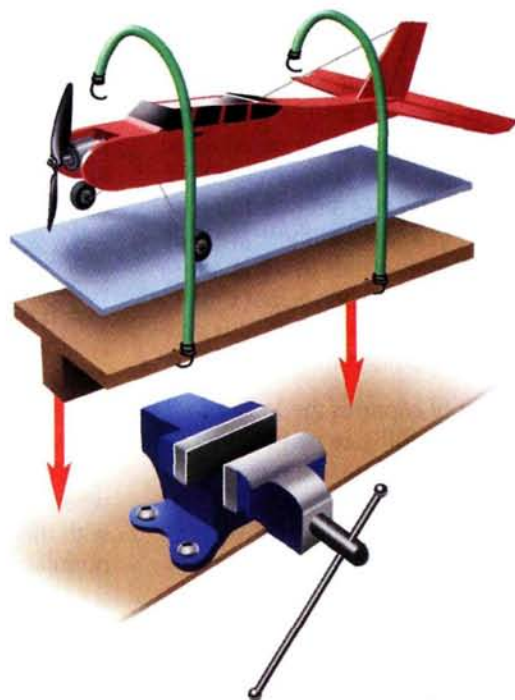
Jack Goodrich, Sterling Heights, MI



### Nose job

If you fly from an asphalt runway and your 4-stroke engine is mounted inverted, you know that on less than perfect landings, this combination can sometimes result in damage to your spinner and valve covers. Head to a local home-improvement center for a length of 10-32 threaded rod. Bend the rod into a U-shape, and install it on the front of the engine mount. Make appropriate cutouts for the "nose guard" in the cowl, and you're ready to go. The guard is almost invisible and adds very little weight; the benefits are obvious.

Rob Lindsey, Las Flores, CA



### The squeeze is on

Sometimes you need a secure platform that's compact yet large enough to hold a wing or fuselage assembly as you work on it. Use your bench vise as a big clamp to hold a 1x2 that's attached to a 1x6 piece of wood that's 24 inches long. You can clamp the wood for a nose-up or nose-down attitude and rotate the vise to various angles for easy access. Add a layer of 1/4-inch-thick foam to the board for protection. Small bungee cords work great to secure the assembly to the board.

Stewart Lange, Lake Orion, MI



**SEND IN YOUR SNAPSHOTS.** *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable, but please do not send digital printouts or Polaroid prints. Emailed submissions must be at least 300dpi. We receive so many photographs that we are unable to return them. All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in! Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.



## Scratch-built Peregrine Freestyle 45

**Edward DeLaura**

East Lyme, CT

Introducing the Peregrine Freestyle! Edward engineered, designed and scratch-built this superb flyer. With a wingspan of 53½ inches, a wing area of 680 square inches, a 17-ounce-per-square-foot wing loading and a weight of 5 pounds, the Peregrine is "very smooth in the air and lands like a trainer." Edward uses a SuperTigre .45 ABC engine, a 4-channel Hitec radio and 5 servos. The plane's covering is 21st Century film. Edward says, "It has proven to be a superb pattern and freestyle aircraft and performs maneuvers such as knife-edge flight." Very nicely done!

## Hawker Hurricane Mk.IIA

**Michael Goetz**

Beavercreek, OH

No need to run from this Hurricane! Michael powers his 16-pound model with an O.S. 1.20 FS engine. The 80-inch foam wing with balsa covering sports two-tone paint, and its blue underside camouflages it from all enemies! Its fuselage is made of polyglass, and the tail surfaces are built-up balsa covered with fabric. You may be wondering about the model's decals. Michael, of course, knows the correct squadron identification; "MBG" is his monogram. But no matter which initials it displays, it's a fantastic-looking model!



## Fokker Dr.I

**John Delevoryas**

San Jose, CA

This great flyer looks beautiful in the California sun. John built his Fokker over the course of 4½ years! With the help of a Futaba radio and the power of an O.S. .70 4-stroke engine, this remarkable aircraft performed incredibly well on its first flight: it completed two Immelmann turns and a few spins. And what a sight it is with its 47-inch wingspan and bright finish! Believe it or not, this wonderfully detailed model weighs only 5¼ pounds. Terrific work, John! Be sure to keep us posted on your upcoming projects.



## Bristol Bombay

**Terry Overton**

Shoreline, WA

Basing it on the 1935 Bombay prototype, Terry designed and built this miniature bomber to showcase its scale appearance, flight and sound. Built to a scale of 11.5 percent of the full-size plane, the model is 95 inches long, has a wingspan of 132 inches and weighs approximately 38 pounds. The fuselage is made of ⅛-inch lite-ply formers and balsa blocks, and the wings are made of white foam and have full-depth box spars and ⅜-inch balsa. The wonderfully sleek finish is MonoKote aluminum, and Solartex silver fabric covers the ailerons, elevators and rudders. The Bombay is powered by two Enya R1.20GP 4-stroke engines with either a 16x6 (best for flight performance) or a 15x8 (for more realistic appearance and sound) 3-blade prop; Terry uses a JR 8103 transmitter, a 940S PCM onboard receiver and 14 Hitec servos—that's right, we said 14 servos. The servos control the throttles, elevators, ailerons, rudders, steerable tailwheel, flaps and bomb releases (of course; what would a bomber be without bomb releases?). In the bottom of the fuselage, Terry has cleverly built a compartment that holds up to four talcum-powder-filled "bombs" that release a talc "smoke" to create a more realistic visual effect on impact. Superb craftsmanship, Terry! ✈





by the Model Airplane News crew

**NEW PRODUCTS** hit the model airplane market all the time, so here's the inside source for what's hot and where you can get it. For every issue, we sift through product announcements, show reports, rumors and prototypes to let you in on the best and the latest. Remember, you saw it here first!

## CLANCY AVIATION

### Lazy Bee laser-cut kit

Andy Clancy's classic designs have won the hearts of modelers everywhere, and now we can look forward to the re-release of his updated and improved kits! The first available is the timeless Lazy Bee, now with laser-cut parts and four building options for the ultimate in versatility. Whether you build it with or without ailerons or with the classic 40-inch wingspan or a longer one, this small-field plane offers exceptional low-speed performance. It has oversize control surfaces and typically has a wing loading of around 6 ounces per square foot. The Lazy Bee loops and rolls easily at speeds at which most planes fall out of the sky! It's also well suited to a variety of power options: a .049 to .20 2-stroke, a .20 to .30 diesel 4-stroke or a geared Speed 400 to a high-output 05 electric motor! With all laser-cut parts, assembly is easy and precise, and the Lazy Bee comes with an updated instruction manual that contains Andy's latest tips and tricks. The icing on the cake? A \$60 price tag! **Clancy Aviation**; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.



## GREAT PLANES MODEL MFG. F4U Corsair

Now you can re-create Pacific air battles from WW II at your local park with the Great Planes F4U Corsair. This ARF can be ready in as little as 2 to 3 hours. The kit includes a 280-size motor, a 4.75:1 gearbox, a prop, a canopy and a complete hardware package. All you need to provide is a 3-channel radio with 2 microservos, an ESC and your choice of a battery pack. All the major sections are painted in a 3-color scheme and constructed of lightweight molded foam with plenty of scale detail. The wing is removable for easy transportation, and the battery compartment is easily accessible for quick battery charging. Specs: wingspan—36 in.; length—27 in.; wing area—236 sq. in.; weight—14 to 16 oz. Price: \$80. **Great Planes Model Mfg.** (217) 398-6300; (800) 682-8948; greatplanes.com.



## EF HELICOPTERS Sabre

Small in size yet big in performance, the Sabre is built and ready to fly right from the box, and with a 20-inch-span rotor, it's the ideal "take-it-and-go" machine. It comes with a gyro/mixer/ESC/receiver combination unit installed, so you need only charge the included 7-cell, 650mAh flight pack, install 8 AA batteries in the transmitter, and go fly! The Sabre features a composite-molded and carbon-fiber frame and has a simple fixed-pitch head and lifting blades, so it's easy to fly and can withstand rough landings. (For really rough landings, EF

Helicopters offers a complete list of replacement parts!) Whether you fly it indoors or outside on

calm days, the Sabre is a great way to learn to fly and enjoy true RC helicopter performance. It costs \$250 and comes with a transmitter and an adapter that can be used with a flight simulator.

**EF Helicopters**; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.







**GREAT PLANES  
MODEL MFG.**

# Super Chipmunk

Now is your chance to own the Super Chipmunk made famous by legendary aerobatic pilot Art Scholl. The Great Planes Super Chipmunk .91 to 1.20 ARF is a scale replica of Art Scholl's preferred ride, right down to the expert MonoKote trim scheme. Not only does this IMAA-legal scale model capture the look of his Super Chipmunk, but it is also capable of re-creating all of those dazzling moves. The kit includes balsa and plywood built-up wings and stabilizer and a painted fiberglass fuselage, cowling and wheel pants. Landing gear, a very complete hardware package and even the pilot figure are also included. This great-looking scale ARF requires only 12 to 15 hours of construction, and at a price of only \$400, there really isn't any reason not to tear up the sky with one. Specs: wingspan—81 in.; length—62.5 in.; wing area—1,000 sq. in.; weight—13 to 14 lb.; engine—.91 to 1.20 2-stroke. Great Planes Model Mfg. (217) 398-6300; (800) 682-8948; greatplanes.com.

## SKS VIDEO PRODUCTIONS Extreme Flight Championships

The Extreme Flight Championships has taken the RC world by storm! Held at the Waco Airfield in Troy, OH, fixed-wing and helicopter pilots pushed



their machines to the limit by freestyling to music. The fixed-wing competition DVD features 18 pilots, including Chip Hyde and Quique Somenzini, and the helicopter DVD features 16 pilots, including Mark Fadely and Scott Gray. This is a must-see event for RC fans everywhere! Each DVD costs \$24.95 plus \$4.75 S&H.

SKS Video Productions (800) 988-6488; (717) 259-7193; sksvideo.com.



## RCAT SYSTEMS GPS DATALOGGER

This versatile new unit, designed to be plugged into the existing RCATS telemetry unit, adds real-time GPS (via an 8-channel receiver) and data-logging capability. It can accept up to a 512MB secure digital (SD) card for storage and offers unprecedented data-logging capability (up to 130 hours of continuous telemetry and GPS or 800 hours of GPS data only can be stored with a 512MB card!). The unit will operate in eight modes, so it can be used as a standalone GPS datalogger/telemetry unit or as part of the RCATS telemetry unit. The GPS Data Logger costs \$300; the existing RCATS telemetry unit costs \$750 and up. RCAT Systems (408) 292-9794; rcatsystems.com.

**E-FLITE**

## Thunderpower Li-poly packs

The folks at E-flite and ThunderPower have joined forces to give modelers a new selection of premium lithium-polymer (Li-poly) battery packs to fit every application under the sun. In addition to significantly longer run times (up to 4 times longer) and lighter weight than their Ni-Cd or NiMH counterparts, E-flite packs feature ThunderPower's Charge Protection Circuitry. During a charge cycle, this advanced circuitry monitors the status of the cells in the pack to make sure that they are charged evenly. It also prevents serious damage from charging errors such as selecting the wrong rate or inadvertently reversing polarity.

E-flite Li-poly packs are available in a variety of capacities with JST connectors or as do-it-yourself packs with 16GA wire and no connector. They cost from \$29.99 to \$79.99 each.

E-flite; distributed by Horizon Hobby Inc. (217) 352-1913; horizonhobby.com.



## SKY HOOKS & RIGGING Micro Brushless Outrunner Drives

The wait for affordable, brushless micro motors is over! Sky Hooks & Rigging offers a range of tiny, 20- to 40-gram motors in 300- to 400-size bodies. The best part? They cost only \$40 to \$55! These little gems provide amazing thrust for their size and weight and draw between 4 and 15 amps, depending on the application. The 300T and 400T are designed for direct drive; although the 300DF and 400H are capable of running direct drive as well, they are designed for high-rpm applications such as gear

drives and ducted fans. The smallest unit, the 300T, weighs just 20 grams and provides 6 ounces of thrust. If you use 2 Kokam 340mAh high-demand Li-poly cells, your entire power system will weigh less than 50 grams!

Sky Hooks & Rigging (905) 257-2101; microrc.com.





POLK'S HOBBY

## Dr. I Fokker

If you like smaller planes but want to stick with glow power, you're in luck; this little 4-channel warbird will perform equally well with a .061 to .10 engine or a geared Speed 400 motor. The Fokker has a 40-inch wingspan, is 26.75 inches long and features all-wood construction, a fiberglass cowl, scale wheels and hardware. It costs only \$125.

Polk's Hobby (973) 351-9800; polkshobby.com.

### AIRBORNE MEDIA

## History's Greatest Aircraft in Profile

Airborne Media's latest additions to its "History's Greatest Aircraft in Profile" series include volumes for jets, the early years, pioneers, transportation and WW II. Each volume of these highly detailed, accurate drawings features five aircraft that have stood the test of time. Each 11x14 profile is printed on archival-quality stock using inks that will not fade over time. And, of course, they can be matted and framed to dress up any room. Each volume comes with five boxed prints and costs \$24.95 plus \$5 S&H.

To see a larger, color version of any of these profile sets, visit the Airborne Media website. While there, you can also browse their other fine art posters, videos, prints and CD-ROMs.

Airborne Media (888) 829-4060; airbornemedia.com.



### MODELFLY

## BEAVER ON FLOATS

Just like the fabulous Modelfly Cessna on Floats, the new Beaver on Floats is bound to be a favorite among floatplane fans! This 61.75-inch-span model has the same semisymmetrical wing section as Modelfly's popular Ready on Floats and features a detailed, blow-molded fuselage, removable one-piece cowl, injection-molded landing gear/float gear legs, widely spaced floats, decorative wing struts and a complete hardware package. The Beaver kit also includes carbon-fiber spreader bars, water rudder and pull-pull cable, and it can easily be converted for land use with supplied wheels and a steerable tailwheel. You'll need to add a .46 2-stroke or .52 4-stroke engine. The Beaver on Floats costs \$260.

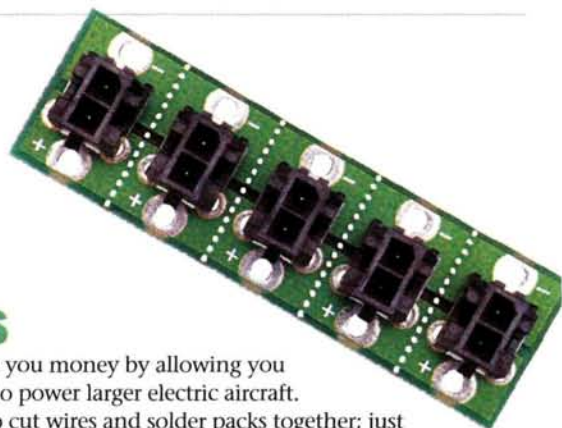
Modelfly; distributed by Falcon Trading (800) 591-2896; falcon-trading.com.

### GREAT PLANES MODEL MFG.

## Parallel Connection Boards for Li-poly packs

Here's a new product that can save you money by allowing you to use up to 5 small battery packs to power larger electric aircraft. These boards eliminate the need to cut wires and solder packs together; just plug and unplug battery packs as needed. Individual packs can be unplugged and charged separately. If you don't need 5 Li-poly batteries connected together, no problem; the Parallel Connection Boards come perforated, so it's easy to snap off connectors to fit your needs. Two versions are available: one that fits the Deans plugs for 2- to 3-cell packs (1200 to 1500mAh) and one that fits Molex plugs for 2- to 3-cell packs (720mAh). Prices: \$10.99 (Molex); \$14.99 (Deans).

Great Planes Model Mfg. (217) 398-6300; (800) 682-8948; greatplanes.com. ✚









## **1** Top Flite P-51D Mustang

### **DASHING THROUGH THE SNOW**

Just under 85 inches of 100-percent-thoroughbred P-51 Mustang—it doesn't get any better than this! And it's an ARF! Designed for Robart pneumatic retracts that drop right into place (including a tailwheel), this giant warbird is ideally suited to 40 to 50cc gas engines. Everyone agrees that at less than \$500, this is one of the best models to get into serious warbird flying with.

**Top Flite**; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; top-flite.com.

# 1







## 2 Double the Fun!

The hottest RC show on the planet will be held at two venues in 2005—first in Anaheim, CA, May 20 to 22 and then in Chicago, IL, June 11 to 12. If you find tickets to either Radio Control Expo (RCX) show under your tree, we promise that it will be worth waiting for! With indoor flight zones, dirt stunt tracks and on-road racing as well as the latest new planes, boats, cars and gear, RCX has something for everyone. Stay tuned to *Model Airplane News* for information on the locations, times and ticket sales, or check out [rxc.com](http://rxc.com).



# 2



# A

hh, the December issue: that means it's once again time for us to show all the glorious goodies that are just waiting to bring smiles to the faces of modelers everywhere! Our annual wish list brings you the best of the best new products. Owing to space limitations, we've had to winnow our choices down somewhat, but we can guarantee that every reader will find something that qualifies as a must-have. So open the magazine to that page, leave it where your significant gift-giver will see it, and start x-ing the days off the calendar. Kris Kringle is on his way!

BY THE MODEL AIRPLANE NEWS CREW

# What's Hot for the Holidays? 25 GREAT GIFTS



3



4



5







### 3 Dave Patrick Models Super Cub

#### UP ON THE ROOFTOP

Known for making some of the best ARF models in the industry, Dave Patrick's newest offering raises the quality bar several notches. Costing less than \$600, the new 1/4-scale Piper PA-18 Super Cub ARF has a 106-inch wingspan and 1,600 square inches of wing area, and it's happy with any engine in the .90 to 1.50 glow class and up to 25cc gasoline power. It has a painted fiberglass cowl; an impressive hardware package; the best instruction booklet we've seen; functional, shock-absorbing, scale landing gear; plug-in wing panels; scale, offset aileron hinges; aluminum lift struts and much, much more. The Super Cub is available in Cub Yellow, white and almost-ready-to-cover versions.

Dave Patrick Models (815) 457-3128; davepatrickmodels.com.

### 4 Carl Goldberg Models Sukhoi SU26MX ARF

#### MELT THE SNOW WITH THIS HOT PERFORMER

High on every aerobatic pilot's wish list is this great performer from Carl Goldberg: the new Sukhoi SU26MX ARF. With a respectable 72½-inch wingspan and a generous 949 square inches of wing area, the Sukhoi offers outstanding flight characteristics that are typical of such an ultralight construction. This .60 to .90 2-stroke-suitable plane with its large, double-bevel control surfaces can do just about any 3D maneuver. This fine kit is reasonably priced at \$319.99 and will make an outstanding holiday package for even the most demanding pilot.

Carl Goldberg Products Ltd. (678) 450-0085; carlgoldbergproducts.com.

### 5 JR Heli Division Venture 50 3D ARF

#### ALL WE WANT FOR CHRISTMAS

The latest Venture series heli from JR shows just how far RC helis have come. This mid-size hot-rod arrives built and can be completed in an afternoon. Designed as a high-performance 3D aerobat, the Venture has a low parts count, and its layout is very simple—perfect for low maintenance and more flight time. A CCPM control system and a belt-driven tail rotor add to the simplicity. Priced at \$350, even Scrooge couldn't resist this whirlybird.

JR; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

### 6 Multiplex Permax brushless motors

#### POWERHOUSE STOCKING STUFFER

Permax brushless motors offer outstanding power and performance that don't shorten flight times. Five motors are available with either direct drive (three) or a strong planetary 4.4:1 gear drive (two). Multiplex also offers brushless-motor speed controllers and Li-Batt Li-poly batteries for the perfect performance match-up. The Permax brushless motors are reasonably priced at \$69.99 to \$109.99, and their maintenance-free design makes them the gifts that keep on giving.

Multiplex; distributed by Hitec RCD (858) 748-6948; hitecrd.com.

### 7 E-Flite Ultimate EP 3D Profile, ARF

#### ULTIMATE INDOOR FLYING

The Ultimate EP 3D ARF biplane is constructed of smooth, white, flat foam and can be assembled in just a few hours. The kit comes with a complete set of lightweight decals, a 370 motor (with a 6.6:1 gearbox) and a 12x6 propeller. You'll be flying this extreme 3D performer in no time. The wingspan measures 28 inches and its overall length is 29.5 inches, so it's great for flying in small indoor areas. Imagine hovering and doing waterfalls, harriers and rolling circles indoors. With its price of just \$49.99, why not ask for two?

E-flite; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

### 8 Fuji Engines BT-50EI

#### WATCH OUT, RUDOLPH!

This powerhouse may just replace all the reindeer on Santa's sleigh! The Fuji BT-50EI gasoline engine offers the same great quality and reliability as the original BT-50 plus the added convenience of electronic ignition. Priced at less than \$480, it's ideal for many large-scale aircraft. The 50EI comes with a Champion RCJ6Y spark plug, a large, efficient muffler, a firewall mount, an illustrated instruction manual, a bulletproof Walbro carb, a spark-plug wrench, a 2.5-inch prop flange with prop washer, an 8mm prop bolt and 11 inches of gas fuel tubing. The 3ci Fuji is rated at 5.2hp at 10,000rpm.

Fuji Engines; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; fujiengines.com.







## 9 WattAge Micro-Flyer

### TREETOP TWINKLE

Who needs a flashing star when you can top your tree with the little Micro-Flyer from WattAge? For just \$40, this ready-to-fly, 9-inch-span foamie comes with a transmitter and a Li-poly flight battery, so you'll have something to fly indoors while you wait for the snow to melt. With about 24 square inches of wing area and a micro-actuator-controlled rudder, this little plane will make you forget how cold it is outside. Living-room pylon races, anyone?

**WattAge**; distributed by Global Hobby Distributors (714) 963-0329; [globalhobby.com](http://globalhobby.com).

## 10 FMA Direct FS8 Co-Pilot

### A CRASH-FREE NEW YEAR

FMA's new FS8 Co-Pilot combines a fail-safe-equipped receiver with a flight-stabilization system to provide the ultimate protection against crashing. The easy-to-use 8-channel unit will actually save your aircraft. Featuring DSR (Digital Signature Recognition) technology, the FS8 memorizes your transmitter's unique signal and rejects all others. Its flight-stabilization feature automatically levels your aircraft when you release the sticks, so it's great for pilot training. Its fail-safe takes control if the signal is lost. Starting at just under \$200, the system also comes with a disc that allows you to see radio setup and operating details on your Windows PC. Other options include a flight-data recorder and a vertical sensor.

**FMA Direct** (800) 343-2934; (301) 668-4280; [fmadirect.com](http://fmadirect.com).

## 11 Norvel AX-40

### POWER TO PLEASE

The largest in the line of high-quality, user-friendly engines from Norvel, this .40 powerplant can turn an APC 10x6 prop at 12,500rpm—more than enough power for your favorite sport flyer. It's also extremely fuel-efficient, easy to fine-tune and, with a price tag of \$110, it leaves room on your wish list for the AX-40's ideal test-bed: the \$100 Sig Four-Star 40 kit!

**Norvel**; distributed by Sig Mfg. (800) 247-5008; (641) 623-5154; [sigmfg.com](http://sigmfg.com).

## 12 Century Helicopter Products Hummingbird Elite Series

### FLY ANYWHERE, ANYTIME

When Santa isn't working in his shop making toys, he likes to get in some relaxing flight time, and there's no better way than with a micro heli. The micro electric-powered Hummingbird CP (collective pitch) is one of the best, and it can be ready to fly in just a few hours. It uses cyclic collective pitch mixing (CCPM) for all types of flying. A minimum of a 5-channel heli radio that supports 120-degree CCPM is needed, as is a speed control and mixer board, 3 servos, a gyro, a battery and a charger. Prices start at \$99 and go to \$489.99 for a complete outfit.

**Century Helicopter Products** (408) 451-1155; [centuryheli.com](http://centuryheli.com).



# 10



# 11



# 12



# What's Hot?

## 13 Sig Mfg. Lil' Rascal

### DIRECT FROM SANTA'S WORKSHOP

With a wingspan of less than 30 inches, the Lil' Rascal is perfect for ball-field and indoor flying. For \$155, it comes expertly built and covered and has an installed 180 motor and gear drive and all the necessary hardware, including landing gear, wheels and propeller.

Sig Mfg. (800) 247-5008; (641) 623-5154; sigmfg.com.

## 14 Cermark Sukhoi

### FROM RUSSIA WITH LOVE

This Soviet unlimited aerobatic powerhouse set new performance standards when it made its debut in world aerobatic competition. The Cermark Sukhoi follows this example and offers excellent aerobatic prowess in a 68-inch-span, 1.20-size package. This 1/4-scale SU-31 costs less than \$250 and is available in two color schemes. It features a reinforced firewall with a replaceable engine mount, painted fiberglass parts and tail-mounted servos for direct elevator and rudder control.

Cermark (562) 906-0808; cermark.com.

## 15 GWS C-47

### PLANES OF CHRISTMAS PAST

GWS offers a new nostalgia plane that everyone—particularly veterans—will enjoy: the C-47 Skytrain. This versatile military utility plane was used in a variety of missions during its long, distinguished career. GWS has reproduced a very detailed and great-flying park flyer that can be enjoyed in any open field. It costs \$87.50, so why not treat yourself?

GWS USA (909) 594 4979; gws.com.tw.

## 16 Sportsman Aviation Excelleron 50

### JINGLE-BELL ROCK

Crank up the music and put on a show with this great-looking pattern ship from Sportsman Aviation. With its high-quality, balsa-and-ply construction and iron-on covering, this 58-inch-span plane will make your holiday dreams come true for just \$240. It comes with a complete hardware package as well as shock-absorbing main gear, and it's a fast build. Add a Magnum XLS 52A 2-stroke (just \$100!) and rock the skies!

Sportsman Aviation and Magnum; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.

## 17 Hobby Lobby Alfa Focke-Wulf FW-190

### SCALE TIDINGS FOR THE NEW YEAR!

If you have even the slightest interest in scale airplanes, then this fantastic foam flyer will really grab your attention. With its fine detailing and minimal assembly, you'll have this warbird patrolling for enemy fighters in no time. Constructed of durable, lightweight foam, it's fully painted and requires a 3-channel radio, 2 microservos, an 8A ESC and an 8-cell, 800mAh NiMH battery. A geared Speed 300 motor powers the Butcher Bird, and it sells for \$119. Hobby Lobby Intl. (615) 373-1444; hobby-lobby.com.





## 18

### 18 MRC Reflex Flight Simulator

**THE WEATHER OUTSIDE IS FRIGHTFUL**

It's cold outside, but there's no need to leave home to fly. The Reflex Flight Simulator provides the RC flying fun you want without your having to brave the elements. The new Reflex Flight Simulator re-creates a number of realistic flying fields on your computer screen and gives you a wide selection of aircraft (18 planes and 17 helicopters). Hone your skills by using a number of flight-training extras such as flying in a strong wind or glaring sunlight, dealing with engine failure and landing in long or short grass. Keep those thumbs nimble with the Reflex Flight simulator for \$234.98 (includes simulator, interface cord and USB adapter).

**MRC** (732) 225-2100; modelrec.com.

### 19 Futaba 7CAP radio system

**A RADIO WORTH WISHING FOR**

The Futaba 7C series (of which the 7CAP is the tops) is a true jack-of-all-trades. Its range of features rivals those of many top-dollar systems, but it comes at a price that won't break your budget. It's so versatile that it can handle all your programming needs, including for helis and sailplanes. It's very user-friendly, offers the same format as the popular 9C transmitter and features digital trims. With its 10 model-memory slots, this might be the only radio you'll ever need! It's priced from \$249.99 to \$349.99.

**Futaba**; distributed by Great Planes Model Distributors Co.

(800) 682-8948; (217) 398-6300; futaba-rc.com.

### 20 ParkZone Stryker

**ALL-IN-ONE HOLIDAY SURPRISE**

It may be molded foam, but the F-27 Stryker offers all the excitement of a stealth fighter! Priced at under \$170, the ParkZone Stryker comes ready to fly and has all the equipment you'll need, including radio, battery, motor and charger. Just attach the nose and twin vertical fins, and as soon as you've charged the batteries, you're ready for your first mission! The Stryker can also be equipped with ParkZone's X-Port Sonic Combat Module so you can go up against your buddies to see who rules the skies!

**ParkZone**; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

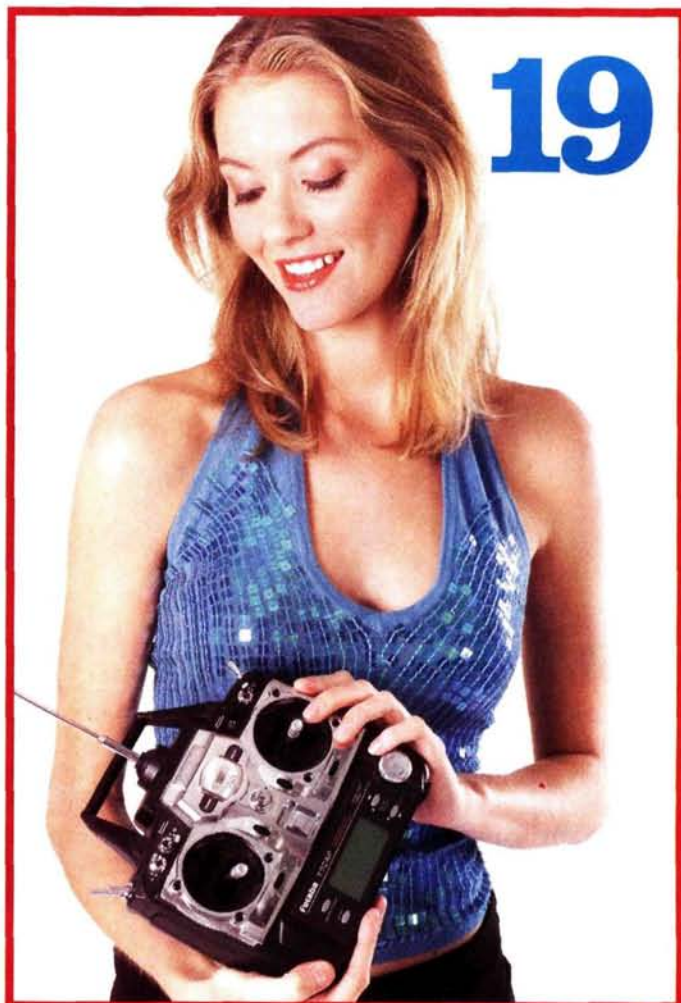
### 21 The World Models Mfg. Co. P-51 Mustang 60 ARF

**WARBIRD WINTER WONDERLAND**

With its high-quality, built-up construction, installed mechanical retractors and iron-on covering, this 64.5-inch-span Mustang deserves to be on your wish list. It features functional flaps for smoother landings and comes with a fuel tank, engine mount, painted fiberglass cowl, spinner, hardware and a detailed pilot. The P-51 Mustang 60 ARF costs \$250.

**The World Models Mfg. Co.**; distributed in the USA by AirBorne Models (925) 371-0922; airborne-models.com.

## 19





# 23



# 24

## 22 Thunder Tiger

### 3D Spirit

#### CATCH THE HOLIDAY SPIRIT

Get into the spirit of the holidays! Of course, we mean the 3D Spirit from Thunder Tiger. Who wouldn't want this flame-decorated balsa beauty? The 3D Spirit ARF includes everything except a motor and radio to get you in the air quickly. With its 53-inch wingspan and brightly colored trim scheme, the plane is easy to see from a distance. The airframe is incredibly light and strong, and the plane is well suited to intermediate pilots who are looking to enter the world of 3D aerobatics. At just \$249.99, it's a sure thing.

**Thunder Tiger;** distributed by Ace Hobby Distributors (949) 833-0088; [acehobby.com](http://acehobby.com).

## 23 Du-Bro

### Giant-scale hardware

#### TOYS FOR BIG BOYS

What pilot wouldn't enjoy a stocking full of Du-Bro goodies? If you're into giant-scale planes, Du-Bro has you covered with its supply of heavy-duty adjustable control horns, heavy-duty ball links, superstrong servo arms, large fuel tanks, wheels and pull-pull control systems for even the largest scale planes. Du-Bro offers high-quality items from airplane accessories to tools—everything you need to stay airborne throughout the New Year.

**Du-Bro Products** (800) 848-9411; [dubro.com](http://dubro.com).

## 24 Super Kraft

### Waco UPF-7 ARF

#### WHILE VISIONS OF BIPLANES DANCE IN OUR HEADS

OK, we know that biplanes can't dance, but if you ever saw Jimmy Franklin put his 1937 Waco UPF-7 biplane through its paces, you'd very quickly change your mind! This classic biplane spans an impressive 72 inches, and Super Kraft uses only the finest materials in its construction. Priced at \$499, this giant-scale ARF abounds with the best hardware ever offered in a kit. Just add a 4-channel radio, 6 servos and your favorite 1.2 to 2.4 glow or gas engine to complete the package.

**Super Kraft;** distributed by Kangke Industrial USA Inc. (877) 203-2377; (631) 274-2058; [kangkeusa.com](http://kangkeusa.com).

## 25 WattAge

### Decathlon EP RTF

#### GOOD THINGS COME IN SMALL PACKAGES

Park flyers are great gifts, especially those that are ready to fly. The WattAge Decathlon EP RTF is a cute-as-a-button model that spans 33 inches, and its 3-channel radio system and powerful, geared Speed 370 motor come completely installed. A couple of minutes with a screwdriver will have it up and flying. And it costs only \$179.99!

**WattAge;** distributed by Global Hobby Distributors (714) 963-0133; [globalhobby.net](http://globalhobby.net). ✈

# 22



# 25





# NEW P-51D MISS AMERICA

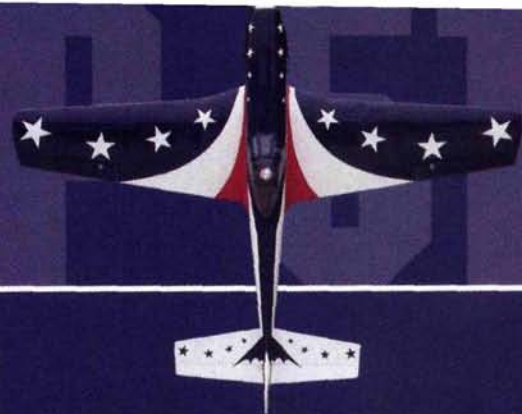


## HAN2775

Wingspan: 65.5 in (166.4 cm)  
Length: 55.75 in (141.6 cm)  
Wing Area: 752 sq in (4851.6 sq cm)  
Weight: 7.0-8.5 lb (3.2-3.9 kg)  
Radio: 5 channels w/6 servos  
Engine: .60-.78 2-stroke  
.72-1.00 4-stroke

## HANGAR 9

*The improved preinstalled landing gear, hardened metal struts and adjustable down locks prevent wobble and allow for easy ground handling.*



## AN AMERICAN AVIATION ICON

She's one of the fastest, most beautiful and certainly most recognizable airplanes in the world. Since 1966, Miss America has traveled all over the U.S., serving as a symbol of freedom and liberty for everyone while capturing such aeronautic honors as Reno Air Racing champion and National Unlimited Class champion.

Now you can fly one of the world's most famous aircraft at your local flying field. Hangar 9's latest addition to its popular P-51D Mustang series is a .60-size scale version of the esteemed Miss America, complete with an authentic red, white and blue UltraCote® trim scheme and preinstalled retractable landing gear.

And it features performance levels to match its extraordinary appearance. Miss America can rip and bank like any nimble .60-size sport plane, handling full-throttle loops, hard turns, low-level breaking passes and high-G maneuvers with assurance. Plus, when the rubber hits the road, you can count on Hangar 9's improved retractable landing gear, which comes factory-installed and offers solid ground handling.







EXCLUSIVE 1ST LOOK!



THUNDER TIGER

Rare

Bearcat

*Legendary Reno-racing Bearcat*





BY JOHN REID

**T**he long-awaited Rare Bear from Thunder Tiger is finally here! For quite a while, many of us have admired this ARF plane at trade shows and in advertisements, but now, the only officially licensed replica of this great-looking Reno racer is at last available. You can own a scale model of this magnificent bird and experience the thrill of piloting one of the best-known pylon racers of all time. Just remember to fly low, fly fast and turn left!







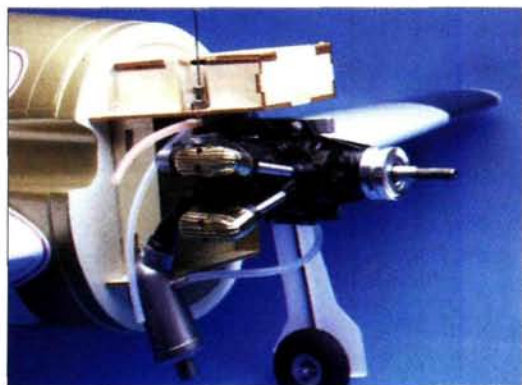
After you've installed the servos in the fuselage, slide the side frame assembly into the rear of the fuselage and then forward until it locks into place.

## FIRST IMPRESSION

The Rare Bear is packaged in a sturdy box with individual compartments that separate all the components. The major parts are sealed in plastic bags to prevent any scuff damage. The model includes a clear-plastic canopy and a fiberglass fuselage and cowl in the original white and gold color scheme. The wings, stabilizers and rudder are all made of built-up balsa expertly covered in heat-shrink material. There are two sheets of laser-cut plywood components along with a wing tube, two decal sheets and formed plastic wheel wells for the retractable landing gear. The aluminum spinner, engine mount, fuel tank, wheels and a complete hardware package (with individual bags of hardware pieces for each construction step) are also included. A well-done, 20-page instruction manual guides you completely through the construction, and although some of the translated English is a bit shaky, I had no problem understanding what should go where. I needed to provide an engine, a radio and retractable landing gear to complete the kit.

## CONSTRUCTION

The Rare Bear requires advanced building skills. There are more parts here than in



other ARF kits, but when you've completed the construction, you'll have an awesome-looking aircraft. Kit construction begins with wing assembly; that involves installing the CA hinges and removing heat-shrink material from the aileron servo wells. Those servos are installed in a servo case that's attached to a hatch cover. The cover is then screwed into place on the underside of each wing, the pushrods are attached to the servo arms, and the control horn is screwed into place.

The Rare Bear includes everything you'll need to install the retractable landing gear (except the gear itself): plastic retractable wheel wells, retract doors, wheels, retract servo links and pushrods. If you decide not to install retractable landing gear, you'll have to fabricate main landing-gear wires because none are included in the kit. For me, it only made sense to purchase the retractable landing gear and install it. The instructions recommend that you not use the included wheels for the retractable gear because they are too heavy for the retract servo, and that is absolutely right. Purchase lighter foam wheels for better retractable landing-gear performance. The retract installation is done during the fuselage construction because the retract servo is installed inside the fuselage. Finish the wing by gluing in the plastic air-cooling inlet on each wing half and applying the decals before you install it.

## FUSELAGE

Construction here begins with building up the inside plywood framing that will hold the servos, the battery

*The Saito 1.20 fits well inside the Rare Bear's large cowl. Because the carburetor is mounted behind the engine, however, the prop hub extends past the front of the cowl.*

## specifications

**MODEL:** Rare Bear

**MANUFACTURER:** Thunder Tiger

**DISTRIBUTOR:** Ace Hobby Distributors Inc.

**TYPE:** scale AFR unlimited pylon racer

**WINGSPAN:** 63 in.

**WING AREA:** 752 sq. in.

**WEIGHT:** 11 lb. 4 oz.

**WING LOADING:** 34.46 oz./sq. ft.

**LENGTH:** 55.5 in.

**ENGINE REQ'D:** .60 to .90 2-stroke; .90 to 1.20 4-stroke

**ENGINE USED:** Saito 1.20

**RADIO REQ'D:** 5-channel

**RADIO USED:** Airtronics VG6000 with 4, 94731Z contest servos and 1, 94734Z retract servo

**FUEL USED:** Wildcat 2&4 Cycle 15% nitro

**PROP USED:** Master Aircrow 14x7 3-blade prop

**PRICE:** \$299.99

**FEATURES:** balsa built-up wings and stabilizers covered with heat-shrink material; nicely painted fiberglass fuselage and cowl; laser-cut plywood parts; a complete hardware package including a fuel tank, aluminum spinner, scale tail gear and wheels; two sheets of decals; and a 20-page instruction manual.

**COMMENTS:** this plane requires a fair amount of building, but it's definitely worth the time and effort. The parts fit is outstanding, and everything assembles exactly as it should. When balanced correctly with adequate control throws, this plane flies aggressively. With a 1.20 4-stroke or a .91 2-stroke, the Rare Bear will streak across the sky at a heart-pounding pace. You'll want to hold on to this plane for a long time.

## HITS

- Stylish looks.
- Solid flying.
- Interlocking laser-cut parts fit perfectly.

## MISSES

- No main landing gear in the kit.
- Wings are difficult to remove with retractable landing gear installed.

and the receiver. Be sure to have the right and left frames on the appropriate sides; refer to the photos often because none of the plywood parts has any identifying



marks. The cutout for the fuel tank will need to be enlarged so the tank will fit, and it's much easier to do that now rather than after the framework has been installed.

The instructions also suggest that you epoxy the center bulkhead into place before you install the side-frame assembly in the fuselage. There are, however, no marks or indentations to guide its positioning. It is much easier to let the center bulkhead rest inside the fuselage and then allow the installation of the side-frame assembly to dictate the bulkhead placement. It will also be much easier to mount the servos in the servo tray before you install the side-frame assembly in the

fuselage. The firewalls are now sandwiched together and installed between the side-frame assembly. Use the engine-mounting bolts to keep the three firewalls in line while the epoxy cures. After you've assembled the firewall and battery box, use 30-minute epoxy to seal all the plywood that will be exposed to engine residue.

#### TAIL FEATHERS

Install the stabilizer by inserting two fiberglass tubes into one of the stabs, then push them through the rear of the fuselage and into the other stabilizer. Then epoxy the horizontal tail halves to the fuselage. The tube will be a tight fit, and you must be careful not to push too hard, or you could

break the ribs. Before hinging the elevators to the stabilizers, thread the torque link onto the torque rod. The hole in the fuselage for the torque rods will have to be enlarged for them to fit, but it's much easier to thread the links on now than after they are inside the fuselage. The rudder is hinged to the fuselage, and the steering arm is attached to the rudder torque rod inside the fuselage. Be sure to trim off enough of the steering arm's outer holes; otherwise, the steering arm will rub against the inside of the fuselage. Now, glue the torque-rod retaining plywood into the fuselage to hold everything in place.

After you've built the tail-gear mount with the appropriate plywood pieces, set it



## flight performance

For the Rare Bear's first flight, I used the recommended control throws and balance, but I found that some of these setups did not fit my flying preferences. After the first flight, I added more elevator throw and moved the balance so the plane was slightly tail heavy. For me, this really improved the model's flight performance and control.

#### TAKEOFF AND LANDING

Getting the Rare Bear into the air is easy! Apply throttle slowly, and it tracks straight down the runway with just the slightest bit of right rudder. With the Saito 1.20 engine pulling this bird, it's airborne quickly, and the climbout is predictable and stable. After climbing the plane to a fairly high altitude, I made the turn back to the runway.

Setting up for landing is easy because the plane remains stable all the way through the landing approach. Because it is a pylon racer, you do have to land it with some speed because if it is slowed down too much, it will tip-stall. But it can be slowed sufficiently for a perfect 3-point landing.

#### LOW-SPEED PERFORMANCE

At lower speeds ( $\frac{1}{4}$  to  $\frac{1}{2}$  throttle), the Rare Bear has more than enough control authority to safely fly close to the ground. If you fly

at less than  $\frac{1}{4}$  throttle, though, you'll run the risk of tip-stalling the plane unless you keep its nose down and maintain some airspeed. If the sticks start to feel mushy or soft at slow speed, just switch to high rates, and you will regain some control authority.

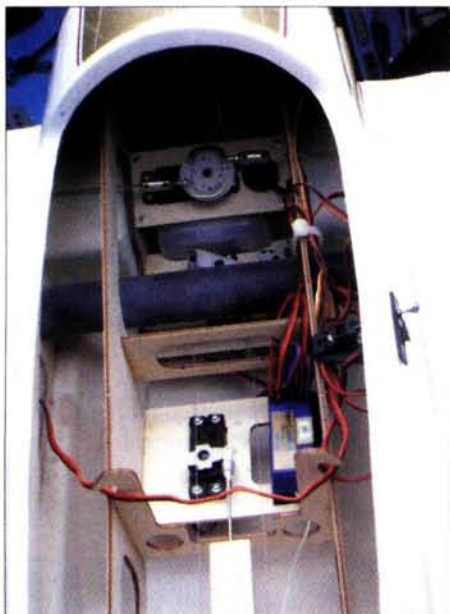
#### HIGH-SPEED PERFORMANCE

High-speed performance is what the Rare Bear was designed for, and you will want to fly it in this domain all the time. The controls are solid and responsive without being overly sensitive. This is a great plane to fly low and fast and then pull up into a nice victory roll. When you use the recommended control throws on the ailerons and rudder, the plane navigates very comfortably around the sky. The flight performance is so good at high speed that you will have no reservations about flying close to the ground.

#### AEROBATICS

Although it isn't an aerobatic plane, the Rare Bear will perform a variety of aerial maneuvers. Rolls are axial and fast, and if you really want to test your reflexes, switch to high rates on the ailerons and then do a roll. The plane will roll so fast that it will be hard to stop it after only one revolution! Loops, rolls, snaps and any combination of these maneuvers are all possible with this plane. And because it's a pylon racer, you can do them all at extreme speeds!





**The fuselage has plenty of room for all of the radio equipment. Notice that the retract servo is mounted right above the fuel tank and forward of the wing-joining tube.**

aside until later. Next, epoxy the tail bulkhead and the tail brace inside the rear of the fuselage to add support for the tail-gear mount. When the epoxy has cured, hook up the elevator pushrod to the servo and elevators. Before gluing the tail-gear mount to the tail bulkhead, glue in the six, small

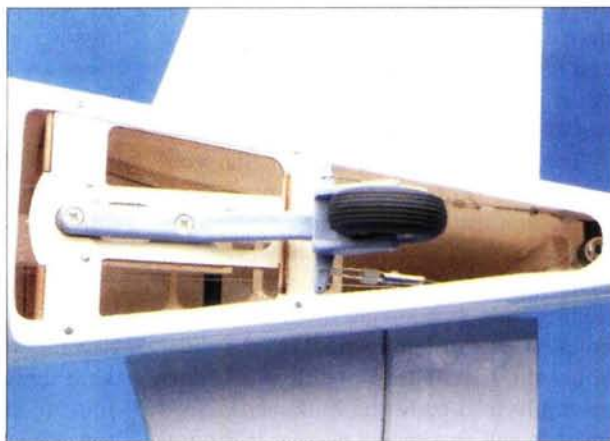
plywood doublers for the screws that will secure the bottom tail cover. It is much easier to install them now rather than after the tailwheel is in place. I assembled the tail gear and the pull-pull cables and hooked everything up. Then, I positioned the bottom tail cover and secured it with six screws.

#### ENGINE INSTALLATION

Assemble the fuel tank and install it in front of the servo tray. I used a Saito 1.20 for the Rare Bear's powerplant. This engine proved to have outstanding performance and reliability. Because it's so large, it was impossible to position the engine back far enough on the antivibration engine mount for a perfect lineup of the spinner and cowl. Because this plane is all about performance, I recommend that you use an engine from the high end of the recommended power band (such as a .91 2-stroke or a 1.20 4-stroke). The only modification I had to make was to drill a new hole for the throttle pushrod.

#### FINAL ASSEMBLY

Now, screw the retract-servo tray into the front of the fuselage just above the fuel



**The scale tailwheel is mounted on the tail bulkhead and brace. The pull-pull system for the rudder and the elevator control horn are all inside the rear of the fuselage.**

tank. The wings are joined to the fuselage with a fiberglass tube and a few screws. Insert the retract-servo pushrods in the fuselage and install them on the retract servo. If you use a heavy-duty standard servo instead of a retract servo, you will have the luxury of using the endpoint adjustment on your transmitter, and that will greatly reduce retract installation time. You will definitely want to do this if you must detach the wings to transport the plane because the retracts will have to be disconnected from the servo each time the wings are removed.

I made the appropriate cutouts in the cowl for the muffler, needle valve and glow starter. Then I installed the cockpit and canopy and applied all the decals. I set all the control throws to the recommended rates and balanced the plane slightly nose-heavy. The Rare Bear was now ready for its maiden flight!

#### CONCLUSION

The Rare Bear requires a little more assembly than the average ARF kit, but the finished plane is a cut above other ARF planes available today. The result is a solid-flying, great-looking, unlimited pylon racer that you will enjoy taking to the flying field week after week. ✚

## RARE BEAR—THE BEARCAT REDEFINED

"How fast is fast enough, and how, exactly, do you make something that is already fast go even faster?"

Lyle Shelton, longtime champion Reno racer and owner/pilot of Rare Bear, has definite answers to both of those questions: at the Reno Air Races, there is no such thing as fast enough, and you do whatever is necessary to go faster—beginning with shoe-horning in as much engine as you can reasonably get up front. In this case, it's a 3,350ci Wright radial that's equipped not only with water/alcohol injection but also with nitrous oxide. That's right; he's slamming "NOx" into an engine that's already putting out nearly 3,000hp! As a result, Shelton and his current pilot, John Penny, have about 4,000hp to play with.

Then, on top of the power, Shelton has whacked 4.5 feet off the wings, shrunk the canopy until the wind doesn't even know it's there and tossed out everything that isn't speed-related, including the flap system—hence, the 140mph landing-approach speed (stock is 98mph).

So what did he gain for all that work? For one thing, he put together one of the longest winning streaks in air-racing history; plus, he set a closed-course record (528mph in 1989) and a time-to-climb record of 3,000 meters in 91 seconds (that's 6,500 feet per minute, or 74mph straight up!).

It appears that you are only going "fast enough" when there is *never, ever*, anyone in front of you.

—Budd Davisson

Visit Budd on the Web at [airbum.com](http://airbum.com)



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SEE THE  
RARE BEAR  
IN ACTION!

**Airtronics** (714) 978-1895; [airtronics.net](http://airtronics.net).

**Master Airscrew**; distributed by Windsor Propeller Co. (957) 41-0250; (916) 631-8385; [masterairscrew.com](http://masterairscrew.com).

**Saito**; distributed by Horizon Hobby Distributors (800) 338-4639; [horizonhobby.com](http://horizonhobby.com).

**Thunder Tiger**; distributed by Ace Hobby Distributors (949) 833-0088; [acehobby.com](http://acehobby.com).

**Wildcat Fuels** (859) 885-5619; orders only (888) 815-7575; [wildcatfuel.com](http://wildcatfuel.com).









PHOTOS BY ERIC BEAN AND JOHN REDD

# SEAGULL MODEL Zero.40



*Fly the terror of the Pacific*



ARF

BY ERIC BEAN

In the early years of WW II, the Japanese Mitsubishi A6M virtually ruled the skies. How did this fast, maneuverable fighter earn the diminutive nickname of "Zero" when it easily outscored its P-40 Warhawk and F4F Wildcat opponents? There's a simple answer: when it was first built, the last digit in the Japanese calendar year was a zero. Although only one flyable Zero is left in the world, you can re-create the drama and terror it inspired with this ARF .40 version from Seagull Model.





### THE KIT

The Seagull Model Zero .40 ARF features built-up balsa/ply structures and is covered with UltraCote. It comes with a complete hardware package, main gear and tailwheel, assembled pushrods, fuel tank, plastic spinner, precut canopy and painted pilot. Additional features include hinged and pinned control surfaces, painted fiberglass cowl and installed throttle cable and engine mount. All of the major pieces are individually wrapped to prevent them from being dinged and scratched.

### LET'S GET STARTED

■ **Wing assembly.** Before I started assembly, I spent about 10 or 15 minutes removing the wrinkles in the covered pieces with a heat gun. First, you must install the main gear in the precut slots in the wing because the gear helps to maintain the wing at the proper dihedral. Each gear wire is secured with two nylon gear straps.

I marked the center of the dihedral brace with a vertical line and inserted the

brace into each wing half. The brace fit rather loosely, but when I connected the wing halves, they fit snugly. I joined the wing halves and the brace with 30-minute epoxy and let the assembly dry overnight.

I used my soldering iron fitted with an old tip to seal the covering material and open up the wing-bolt holes, and then I glued the supplied bolt-hole reinforcement plates onto the wing. Following the instructions, I easily completed the aileron linkages and the aileron-servo installation and positioned the control horns. I made sure that the aileron linkages were perpendicular to the aileron hinge line and not parallel with the wing's centerline.

■ **Engine installation.** The supplied fuel tank didn't fit as far forward as I liked, so I replaced it with a Sullivan 10-ounce rectangular tank fitted with a three-line setup for fill, carburetor and pressure. After threading the fuel lines out through the front of the firewall, I braced the tank with a few pieces of scrap balsa.

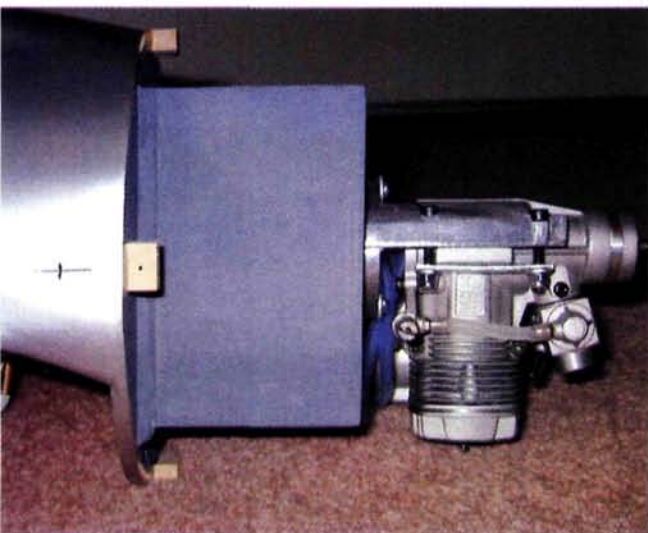
The manual recommends that you power the Zero with a .40 to .48 2-stroke or a .50 to .82 4-stroke, and I chose an O.S. .46 FX because it could be bolted right onto the mount and lined up perfectly with the installed throttle linkage. The original Zero had a 3-blade prop, so I went with a Zingali 10x6, 3-blade, black fiberglass prop and a matching 2½-inch black spinner.

Fitting the cowl was not difficult. I measured the muffler and marked the approximate

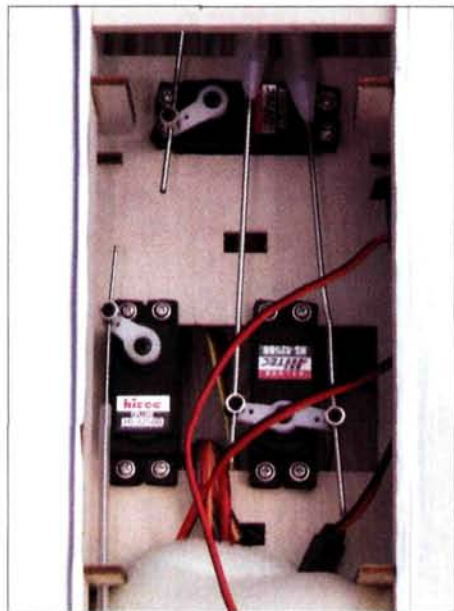
position using tape attached to the cowl. I removed material with my Dremel tool fitted with a high-speed cutter, and then I switched to a drum-sander attachment and kept trial-fitting the cowl until I was satisfied. I epoxied the four mounting blocks into place and marked each of their centers with a small X. I put a piece of tape on the fuselage at each block, and I continued the horizontal line from the block's centerline onto the tape. I then marked another line 1 inch from the vertical centerline of each block. With the cowl held in place, it was easy to mark the positions for the mounting screws. Using the same trick made it easy to locate and drill out the hole for the mixture screw.

■ **Tail-feather assembly.** I installed the tailpieces quickly and easily with 30-minute epoxy. When you use a hobby knife to remove the covering on the surfaces to be glued, be sure not to penetrate the underlying balsa. Installing the pushrods required a little patience and many references back to the pictures provided. I had to put two small bends in each of the pushrods to align them with the control horns.

There's plenty of room in the fuselage for the radio installation. I used a Du-Bro Quick Mount for my switch harness and routed the antenna wire out of a small hole drilled in the tail block. The small tail of the antenna rests inside the fiberglass tail fairing and cannot be seen. The fairing is held in place with small wood screws. I replaced the supplied chrome screws with black ones.



**The O.S. .46 FX is bolted to the installed engine mount. The marks on the side of the fuselage help to align the cowl-mounting screws.**



**The interior of the fuselage easily holds 3 standard-size servos. The rudder servo uses two pushrods—one for the rudder and one for the steerable tailwheel.**





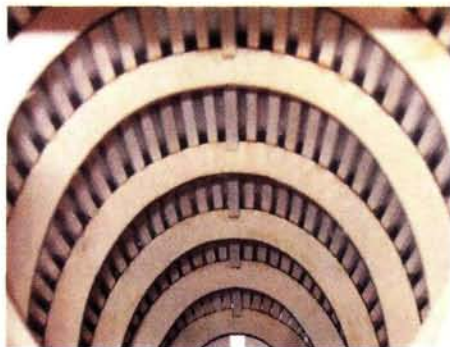
The cowl is large enough to cover most of the O.S. .46 FX; I just had to make an opening for the muffler.



The kit includes the framed canopy and pilot. It's a nice touch that adds realism and scale to Seagull ARFs.

#### FINAL ASSEMBLY

All I had left to do was to glue the included pilot and canopy on with Zap-A-Dap-A-Goo II and add some of the supplied



Here you see how the manufacturer builds up the fuselage to get the round shape. Very nice workmanship.

decals for the finishing touches. I had to bolt 14 ounces of lead to the engine mount to get the CG to the rearmost suggested location, and although the finished weight was 7 pounds 7 ounces (1 pound over the recommended flying weight), the Zero's flight performance didn't suffer.

#### FINAL THOUGHTS

The Seagull Model Zero fighter is a great value for its \$160 price tag! It can be assembled quickly, the parts fit is outstanding, and it has good flight characteristics for a sport-scale airplane. I enjoyed building and flying this plane and recommend it to anyone who's looking for a nice sport-scale aircraft. ✈

#### TAKEOFF AND LANDING

If you slowly apply power, the Zero requires only a little right rudder to keep it pointing down the runway. It eats up a fair amount of runway before it lifts off with just a touch of backpressure on the elevator stick. Aileron and rudder coordination is a must because the Zero really wants to sag in the turns. By using  $\frac{1}{2}$  throttle on base and maintaining some power until over the runway threshold, I found the Zero easy to land.

#### LOW-SPEED PERFORMANCE

At low speed, the controls are very mushy, and it is a little uncomfortable to fly unless you're at altitude or flaring to land. Power-off stalls result in a mild spin and require that you neutralize the controls plus add a little power to get the Zero flying again.

#### HIGH-SPEED PERFORMANCE

At full throttle, the Zero tracks quite nicely, and the controls give a positive response without being oversensitive.

The Zero looks great in the air, especially when coming by for a low high-speed pass down the runway.

#### AEROBATICS

This is a semi-scale sport airplane, so I didn't expect more than limited aerobatic capability, especially because of its high wing loading. Basic maneuvers are straightforward with this plane: rolls, Immelmann turns and stall turns are all easily accomplished; for nice round loops, you should initiate this maneuver from a shallow dive.



The editors wish to thank the members of The Palomar (CA) R/C Flyers for the use of their flying field.

## specifications

**MODEL:** Zero .40 ARF

**TYPE:** scale ARF

**MANUFACTURER:** Seagull Model

**DISTRIBUTOR:** Horizon Hobby Inc.

**WINGSPAN:** 58 in.

**LENGTH:** 43 in.

**WING AREA:**  
538 sq. in.

**WEIGHT:** 7 lb. 7 oz.

**WING LOADING:** 31.8  
oz./sq. ft.

**RADIO REQ'D:**  
4-channel with  
5 servos

**RADIO USED:** JR 8301  
transmitter, Hitec  
Electron 6 receiver,  
Hitec HS425BB servos

**ENGINE REQ'D:** .40 to .48  
2-stroke or .50 to .82  
4-stroke

**ENGINE USED:**  
O.S. .46 FX with  
C-Tronics onboard glow driver

**PROP USED:** Zingali 10x6 3-blade

**FUEL USED:** Wildcat 2&4 Cycle  
15% nitro

**PRICE:** \$159.99

**FEATURES:** built-up fuselage and wing; UltraCote covering; all movable surfaces hinged and pinned; fiberglass cowl, precut landing-gear slots, installed engine mount; installed throttle cable; hardware includes a fuel tank, assembled pushrods, control horns, clevises and spinner.

**COMMENTS:** the Seagull Zero .40 ARF is well built and looks great. If you love warbirds, this will be an excellent addition to your hangar.

#### HITS

- Easy to build.
- Complete hardware package.
- Great-looking airplane.

#### MISSES

- Required 14 ounces of lead in nose to get correct CG.

C-Tronics (201) 818-4289; c-tronicsinc.com.

Dremel (800) 437-3635; dremel.com.

Du-Bro Products (800) 848-9411; dubro.com.

Hitec RCD Inc. (858) 748-6948; hitecrad.com.

Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

JR; distributed by Horizon Hobby Inc.

O.S. Engines; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; osengines.com.

Seagull Model; distributed by Horizon Hobby Inc.

Sullivan Products (410) 732-3500; sullivanproducts.com.

Wildcat Fuels, (859) 885-5619; orders only (888) 815-7575; wildcatfuel.com.

Zap; zapglue.com.

Zingali; distributed by J&Z Products (310) 539-2313; zingerpropeller.com.





THE WORLD MODELS

# Spitfire

*Giant  
"Battle of  
Britain"  
classic*

G.S.





BY STAN KULESA

**A**s a boy, I was hooked on aviation, and whenever possible, even my book reports were on the topic I loved. To this day, I remember a story about a Royal Air Force fighter pilot who, despite being a double amputee, convinced his superiors of his competence and passionately defended his country with great success. The World Models Spitfire G.S. ARF nicely replicates one of the premier Battle of Britain aircraft.

#### THE PLANE

The World Models Spitfire features balsa and ply construction and iron-on covering with camouflage paint applied to sections. It comes with a two-piece wing, a painted fiberglass cowl and access hatch, a nylon spinner, a two-piece nylon engine mount, a fuel tank, decals, a painted pilot figure, 4-inch-diameter wheels and hardware. The installed mechanical retracts are a very nice touch. The Spitfire has pull-pull controls for the rudder and split elevator, and a 1.60 2-stroke is recommended. All of the parts were well packed and relatively easy to identify. The 15-page instruction manual was scant on written details, but many photos and drawings coach the builder through assembly.

■ **Wing assembly.** Each wing panel has 11 ribs. The load-bearing ribs are made of plywood; the rest are balsa. The leading and trailing edges, the center section and the wingtip area are sheeted with balsa. The wheel wells are one-piece fiberglass molds.



The ailerons and flaps are already attached to the wing with three pinned hinges.

Start by attaching the wheel-well covers to the wire landing gear, and then mount two low-profile servos and snake the servo extensions through the center section so that they exit the wing through holes on the top. Pull strings are in place to help with this. The retract servos are installed through a hole in the top of the wing, and you're supposed to cover them with a patch of iron-on material, but I opted to build balsa hatch covers for easier access to them. The landing gear wire is soft and must be pulled forward periodically to make it fit into the wheel wells.

The wing panels are connected by an aluminum-tube wing joiner (snugly filled with dowel material) along the main spar area. A second aluminum tube serves as an

alignment aid. The wing panels are held together with L-brackets and screws. Being able to disassemble the wing is a plus for modelers who have smaller vehicles. The wing is mounted on the fuselage with two dowel pins on the leading edge and two metal screws that pass through a fiberglass fairing on the trailing edge.

■ **Fuselage and tail feathers.** The balsa-sheeted fuselage has a plywood frame with lightening holes. You'll have to add three plywood servo trays and brace them with balsa triangle stock.

To install the stabilizer halves, slide them over the aluminum tube that passes through the fuselage; two dowel guides help to align the halves. A metal screw tapped into the aluminum tube through the bottom of each stabilizer half holds it in place.





The stab is detachable, but for strength, I recommend that you epoxy the stabilizer halves into place. The split elevator is already attached to the stabilizer with three pinned hinges. I used 5-minute Zap Z-Poxy to mount the fin on the fuselage. The rudder is attached to the fin with three pinned hinges. The instruction manual does a good job of explaining how to properly align the stabilizer, fin and wing. The fin, stabilizer and elevator are balsa-sheeted, but the rudder has a balsa frame. The entire empennage has an airfoil shape. A shock-absorbing tail-wheel assembly is screwed into the aft end of the fuselage bottom, and a wire extends from it into the rudder for steering.

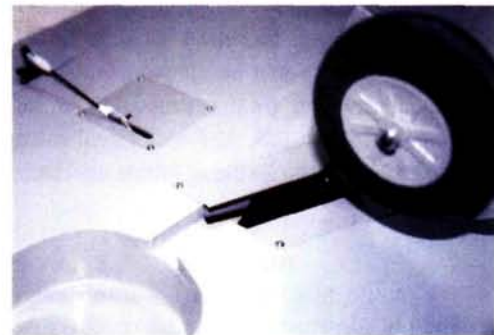
I attached the cowl to the fuselage sides with four screws and then attached the hatch to the bottom of the cowl with 10 screws.

■ **Radio installation.** You'll need 9 servos for this model: one for each aileron, one for each flap, one for each retract, one for the elevator, one for throttle and one for rudder. Radio installation is simple, and the fuselage is roomy. I used my Airtronics RD6000 Super system with 743 double ball-bearing servos for the rudder, flaps and ailerons, but I opted for a 358 high-torque, aluminum-gear, double-ball-bearing servo for the elevator. I chose an Airtronics 322 servo for the throttle and

used 924 low-profile servos for the mechanical retracts.

Each aileron, retract and flap servo is attached to a molded, servo-mounting block in its own removable fiberglass hatch. Install them before you join the wing panels. I used servo extensions and a Y-connector for each aileron and retract servo. For the flaps, I used a Maxx Products electronic servo-mixing device called the "Miracle Y" so that they will descend simultaneously. The rudder, elevator and throttle servos all have their own plywood tray. I was pleased to note that the rudder and elevator trays were reinforced with a double layer of plywood where the screws pass through them. The rudder tray is slightly higher than the elevator servo to accommodate the rudder's pull-pull cable setup. The battery pack fits neatly under the fuel tank, and the receiver is under the throttle servo. I threaded the receiver antenna through a tube that I ran down the aft interior of the fuselage.

The manual recommends that you use a pull-pull setup for the elevator, too, but I opted for a solid pushrod because it was easier to install; all other control surfaces use wire pushrods. The elevator is a unique assembly process: an interior bellcrank fits snugly in the middle of an aluminum bar; a pushrod connects this



**Mechanical retracts come installed. Screws attach the wheel-well covers to the wire landing gear; the wells are one-piece molded fiberglass.**



**The elevator controls feature a unique assembly process.**

bellcrank to the servo. Through access holes on either side of the rear of the fuselage, the ends of the bar are slipped through nylon brackets just below the





## flight performance

### FLIGHT PERFORMANCE

At the field, my trusty Salto 1.80 started right up. I began with the recommended control throws and found that they were right on. This big warbird certainly attracts its fair share of attention in the air!

### TAKEOFF AND LANDING

I fly from a grass runway, and with throttle, the model had a tendency to tip onto its nose—even with full up-elevator. To take off, I point it into the wind and immediately go to full throttle. It lifts off the ground rapidly in about 25 to 30 feet. The climbout is solid, so you have plenty of time to raise the retracts.

When the model is lined up with the end of the runway, it will gradually settle as you reduce throttle, although you must maintain sufficient airspeed.

### LOW-SPEED PERFORMANCE

At low speeds, the control-surface response doesn't deteriorate markedly. Stalls didn't have much of a snap. Once the retracts

have been dropped, you can feel the added drag. The split flaps contributed somewhat to the Spitfire's overall slow-speed performance.

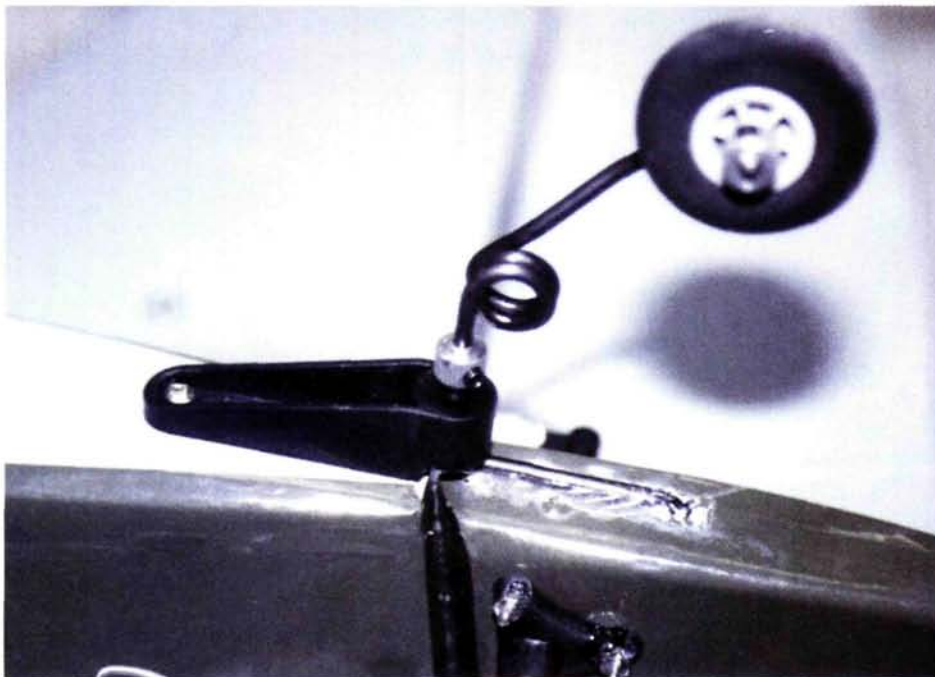
### HIGH-SPEED PERFORMANCE

The Salto 1.80 4-stroke provides superior vertical performance. With full power, control response is smooth and stable. The model "locks into" maneuvers, and with the recommended throws, it doesn't snap out of the maneuvers.

### AEROBATICS

The Spitfire easily does loops of more than 100 feet in diameter without any wingtip stalls. Rolls are on the axis, and spins are snappy and quick, but inverted spins are a bit wider. Inverted flight requires very little down-elevator. Knife-edge flight in both directions is superb. After I increased rudder control, stall-turn performance improved.





A shock-absorbing, steerable tailwheel assembly is screwed to the aft end of the fuselage bottom.

stabilizer's leading edge. I slipped washers and ball joints over the ends of the bar and then screwed the two exterior control horns into place. Wire pushrods connect these exterior control horns to the control horns on each half of the elevator. This process eliminates differential. An exploded-view drawing in the instruction manual provides sufficient assembly detail.

I had excellent flight results with the manufacturer-recommended control throws.

■ **Engine.** The model comes with a two-piece nylon engine mount and all the hardware (screws, nuts, washers, etc.) needed to attach the engine to the mount and the mount to the firewall. I powered The World Models Spitfire G.S. with a Saito 1.80 4-stroke engine that I mounted inverted, and it swings a wooden Master Aircscrew 16x8 prop. If you use a 2-stroke, the firewall is also drilled for a slightly tipped mount so that the muffler can fit under the fuselage bottom. A white nylon spinner with an aluminum backplate is provided. I also used a Tru-Turn 8x1.25mm Double Jam Nut adapter with a 2¾-inch screw and added a Du-Bro Kwik-Fill fueling valve.

Instead of using screws to hold the canopy in place, I glued it on with Pacer Formula 560. I had to add 3.5 pounds of weight to the nose to get the plane to balance.

#### CONCLUSION

If you would like an easy-to-build, giant-scale ARF version of one of the most beloved WW II aircraft, The World Models Spitfire delivers. I was impressed by how quickly I was able to assemble it, and in addition to its distinctive looks, it flies like a .60-size pattern ship. ✈

## specifications

**MODEL:** Spitfire G.S.

**MANUFACTURER:** The World Models

**DISTRIBUTOR:** Airborne Models

**TYPE:** stand-off scale

**WINGSPAN:** 80 in.

**WING AREA:** 1,138 sq. in.

**WEIGHT:** 16 lb. 2 oz.

**WING LOADING:**  
32.6 oz./sq. ft.

**ENGINE REQ'D:**  
1.60 2-stroke

**ENGINE USED:**  
Saito 1.80 4-stroke

**PROP USED:** Master  
Aircscrew 16x8

**RADIO REQ'D:**  
6-channel w/9 servos

**RADIO USED:** Airtronics  
RD6000 Super

**FUEL USED:** Wildcat  
30% Heli-Mix

**PRICE:** \$499.99

**FEATURES:** balsa/plywood construction, nylon spinner with aluminum backplate, 15-page instruction manual, detachable 2-piece wing, detachable stabilizer, decal sheet, fiberglass cowl, pull-pull controls for rudder and elevator, functional split flaps, preinstalled mechanical retracts, clear canopy and assorted hardware.

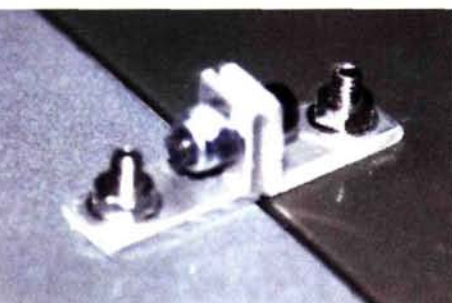
**COMMENTS:** assembly is quick, and the result will draw a lot of attention at the flying field.

#### HITS

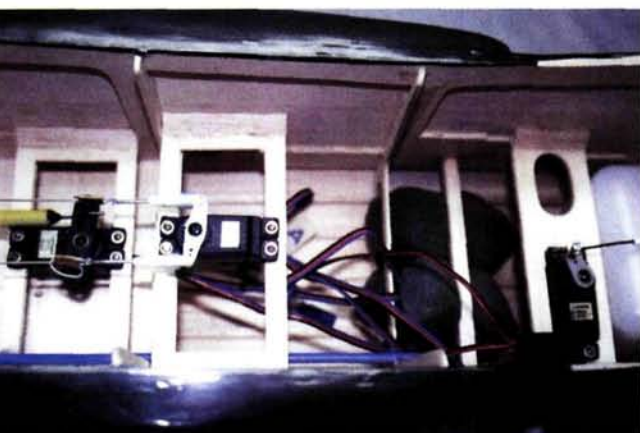
- Easy, fast assembly.
- Complete package.
- Quickly detachable wing panels.

#### MISSES

- Instruction manual didn't include enough written details.
- Landing-gear wire is soft.



The wing panels are connected by an aluminum-tube wing joiner along the main spar area. A second aluminum tube helps with alignment.



The rudder servo tray is slightly above the elevator servo to accommodate the pull-pull cable setup.

**Airtronics** (714) 978-1895; [airtronics.net](http://airtronics.net).

**Du-Bro Products** (800) 848-9411; [dubro.com](http://dubro.com).

**Master Aircscrew**; distributed by Windsor Propeller Co. (957) 41-0250; (916) 631-8385; [masteraircrew.com](http://masteraircrew.com).

**Maxx Products Intl. (MPI)** (800) 416-6299; (847) 438-2233; [maxxprod.com](http://maxxprod.com).

**Pacer Technology** (800) 538-3091; [pacertechnology.com](http://pacertechnology.com).

**Saito**; distributed by Horizon Hobby Inc. (800) 338-4639; [horizonhobby.com](http://horizonhobby.com).

**The World Models Mfg. Co. Ltd.**; distributed in the USA by AirBorne Models (925) 371-0922; [theworldmodels.com](http://theworldmodels.com); [airborne-models.com](http://airborne-models.com).

**Tru-Turn Precision Model Products**; distributed by Romco Mfg. (713) 943-1867; [tru-turn.com](http://tru-turn.com).

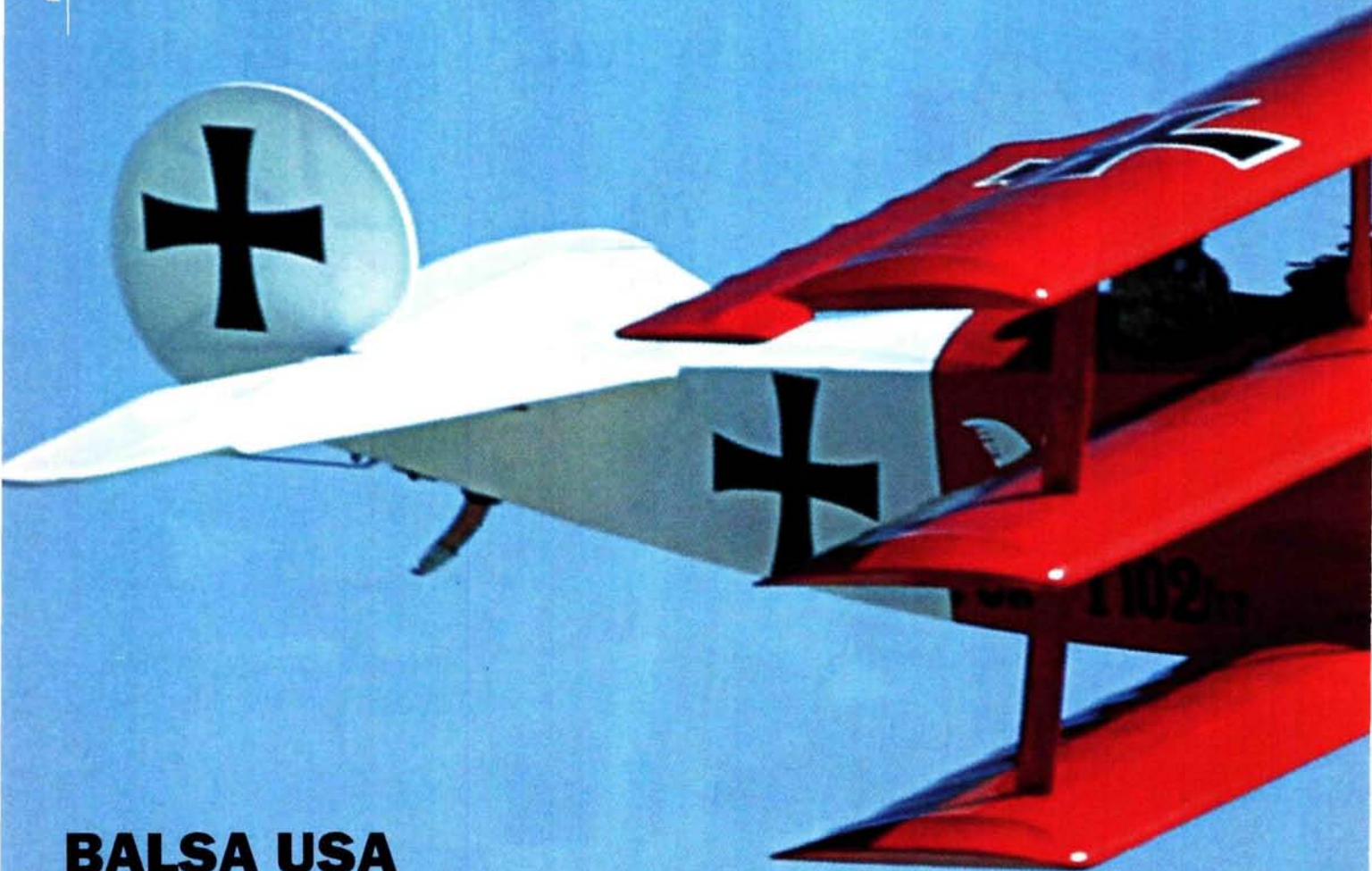
**Wildcat Fuels** (859) 885-5619; orders only (888) 815-7575; [wildcatfuel.com](http://wildcatfuel.com).

**Zap**; [zapglue.com](http://zapglue.com).





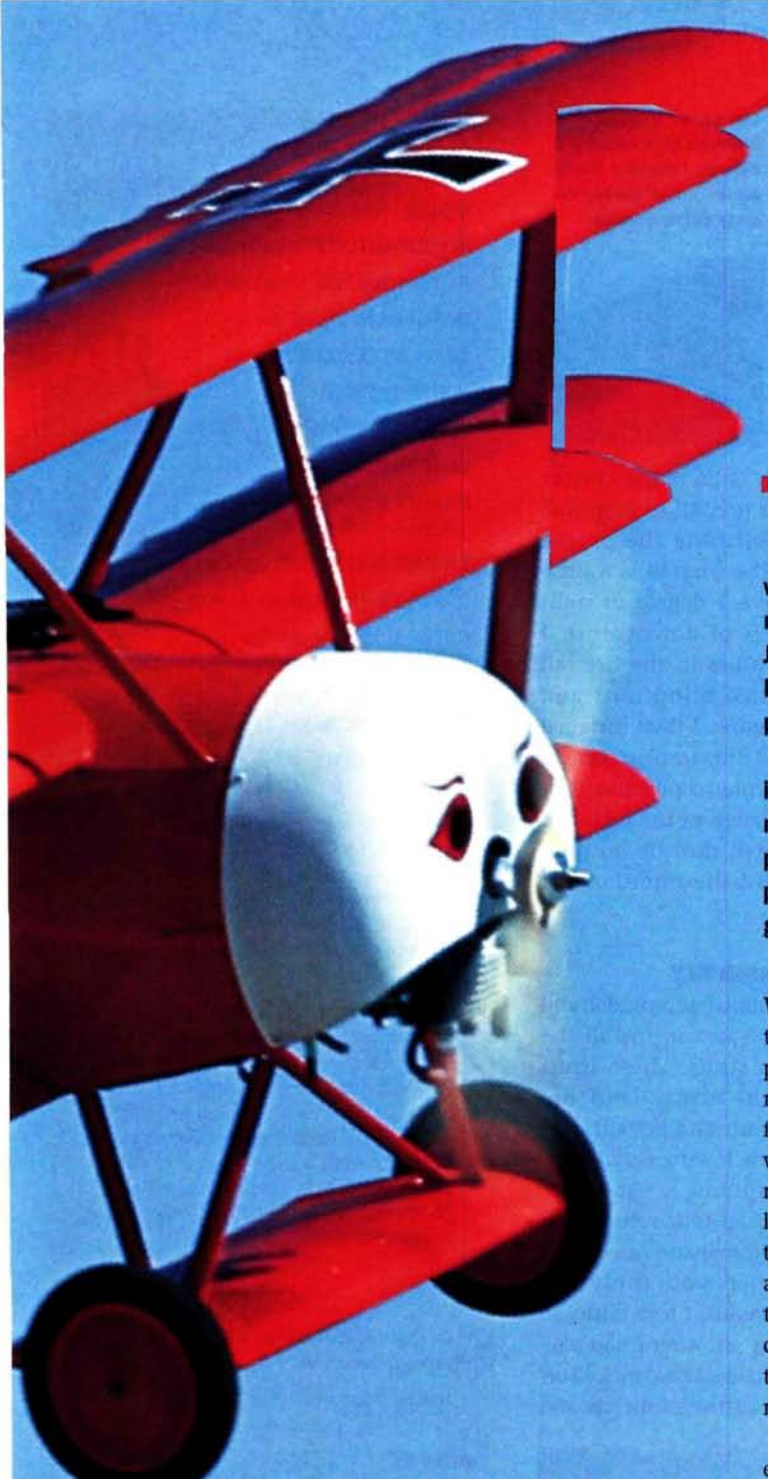




**BALSA USA**

# Fokker TRIPLANE





# The infamous WW I warbird in 1/4 scale

BY TOM CARTER

**T**he Fokker Dr.I is one of WW I's most famous fighters. Inspired by the 1916 Sopwith triplane, the Dr.I enjoyed better maneuverability than any other fighter of the time. Although the triplane was not particularly fast compared with other fighters, it proved a formidable opponent in the hands of skilled aces such as Richthofen, Jacobs and Udet. It was replaced in spring, 1918, by the far superior Fokker D.VII; nevertheless, it came to symbolize the German air campaign in the Great War.

The Balsa USA 1/4-scale Fokker DR.I kit reproduces this outstanding WW I fighter. The kit includes all of the balsa and plywood you'll need to construct a nicely detailed flying model plus three full-size plans, an informative instruction manual and a complete hardware package. The basic building blocks are all there; all you'll need is glue and a desire to build.

**Wings.** I began by unrolling all three sets of plans and then read the manual to check the steps against the plans. I also checked the parts in the box to make sure that all of the wooden pieces—the ribs, spars, etc.—were there. The three wings have a flat-bottom airfoil for easy construction and use a standard D-tube design. I started with the bottom wing and followed the manufacturer's recommended lamination technique for the leading edges. I placed the lower spars on the straight edge of the bottom sheeting and pinned them down securely. I placed all of my ribs on the lower spar and aligned them with the plans; then I tack-glued them into place. I then added the top spar and made sure that all the ribs were at 90 degrees to the work surface before I glued everything together. I then added the top sheeting and trailing edges. The wingtips are made of an angled piece of sheet balsa that's braced by two gussets.

The middle wing is constructed in the same way as the first, except for the center decking that blends into the fuselage when the wing is bolted into place. The center section also houses the cabane strut attachments. Two screws attach the middle wing to the fuselage, and I installed paper tubes to guide the bolts through the decking and wing.

The upper wing is built like the other two, but it has ailerons. The plans don't show an access hatch for the aileron servos, so I made flush panels for easier access. All three wings must be built, installed and properly aligned before you can install the interplane struts.

**Fuselage.** I built the first fuselage side-frame over the plans, and then I built the second side. To make sure that the fuselage would be straight, I put the two frames together to check that they were identical; working toward the cockpit area, I installed the cross-braces and bulkheads, and the fuselage started to take shape. Internal lite-ply doublers at the front of the fuselage add strength to support the middle wing, firewall, landing-gear blocks and lower wing. I checked the bottom and middle wings' alignment by measuring from each wingtip to the tail before I drilled and tapped the

PHOTOS BY JOHN REID





The upper wing has ailerons that require 2 servos. I made a flush panel out of lite-ply for easy servo access.



wing-bolt holes. I hardened the tapped hole threads with thin CA. Before the top wing can be attached to the fuselage, the cabane struts must be installed and aligned correctly. The jig provided makes this critical job easy. With the wing attachment complete, I moved on to the tail.

**Tail feathers.** The stabilizer and rudder are stick-built and constructed on top of the plans. After the glue had dried, I sanded them and made the hinge slots; make sure that they fit together and work smoothly. A healthy chunk of birch runs through the center of the rudder; it comes slotted to accept the hinge rod that connects it to the fuselage. I epoxied the horizontal stabilizer in place and made sure that it was aligned with the wings. The rudder is attached to the fuselage after everything has been covered.

**Landing gear/sub-wing.** A bit of soldering is required to assemble the main landing gear, but the whole process is explained very well in the instructions. The sub-wing (which contributes to the model's total lift) fits between the main wheels, and it's built in three sections over the plans. It is then fastened with metal straps and screws.

**Engine.** The Zenoah G-26 is the correct length for the proper firewall-to-prop hub clearance, but establishing the proper engine position on the firewall is a little tricky; you must have 1 degree of right thrust and 2 degrees of downthrust. I marked and drilled holes in the firewall and used the supplied blind nuts and bolts to attach the engine. I then installed a 24-ounce tank, and the ample room in the fuselage allowed me to position it at the proper height relative to the carb. For a short, uncomplicated throttle pushrod installation, I installed the throttle servo on the firewall.

#### FINAL ASSEMBLY

Once you have assembled the model and mounted the wings, you can install the one-piece interplane struts. These struts run through all the wings and are attached with blind nuts and bolts to plywood tabs built into each wing panel.

To finish the triplane, I used 21st Century fabric covering: four rolls of red (three for the wings alone!) and one roll of white. Use care when you apply the included water-slide decals; I tore mine, so I had to order another set. After I had covered everything, I installed the control surfaces and connected all the pushrods and

## specifications

**MODEL:** 1/4-scale Fokker DR.I

**MANUFACTURER:** Balsa USA

**TYPE:** scale WW I triplane kit

**WINGSPAN:** 70.75 in.

**WING AREA:** 2,030 sq. in.

**WEIGHT:** 15 lb.

**WING LOADING:** 17 oz./sq. ft.

**LENGTH:** 56 in.

**ENGINE REQ'D:** 1.20 to 1.50 4-stroke or G-23

**ENGINE INSTALLED:** Zenoah G-26

**RADIO REQ'D:** 4-channel w/5 servos

**RADIO USED:** Airtronics RD6000 with 5 Airtronics 94102 servos

**PROP USED:** Zinger 18x6

**PRICE:** \$249.95

**FEATURES:** a good assortment of wood, including AAA-quality balsa, plywood and hardwood; laminated leading edge and balsa covering; prebent landing gear and cabanes; complete hardwood package.

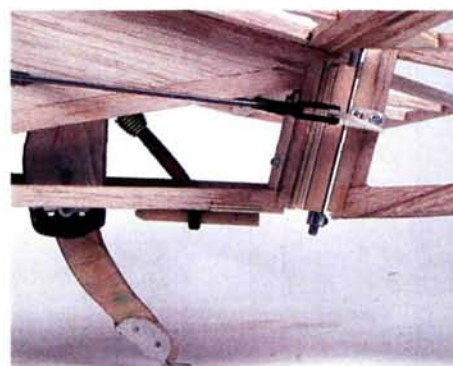
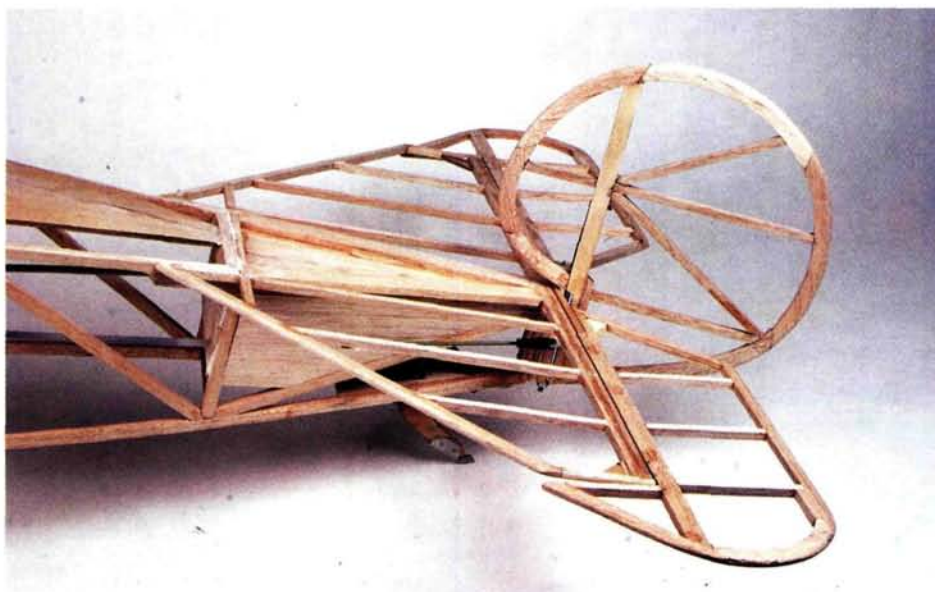
**COMMENTS:** this is a very well-designed kit that includes top-quality wood and hardware. From the first flight, I was very impressed with the plane's stability and performance, which are partly attributable to the power combination of the Zenoah G-26 engine and 18x6 Zinger prop. This setup gives the triplane the perfect combination of power and stability.

#### HITS

- Complete kit with an abundance of top-quality wood.
- Instructions are very thorough.

#### MISSES

- Large water-slide decals tear easily.



Left: the stick-built tail surfaces are light yet strong. The one-piece rudder pivots on a hinge rod that attaches it to the fuselage. Above: I made a shock-absorbing tailskid.



## flight performance

## TAKEOFF AND LANDING

I taxied to the far end of the runway so I could take advantage of its length if I needed to. When I applied the throttle, the Zenoah G-26 revved right up, and the triplane rolled down the runway. After only 15 or 20 feet, it left the ground and was in the air with very little effort. Slight up-elevator and a little right trim were all the plane required to achieve level flight. It makes nice, slow, lumbering turns, but coordinated aileron and rudder inputs are necessary. On final approach, keep the speed up and make a gentle descent. For a nice flare as the wheels touch the ground, feather the throttle a bit as you add a little up-elevator. After touchdown, the plane rolls out quite nicely and has good ground handling despite its closely spaced wheels.

## LOW-SPEED PERFORMANCE

At low speeds, the triplane handled very well, and the controls were very responsive; it didn't exhibit any tendency to tip-stall. I made a low-speed pass, and the plane handled great. It required minimal up-elevator to stay level and carried itself quite well through every test.

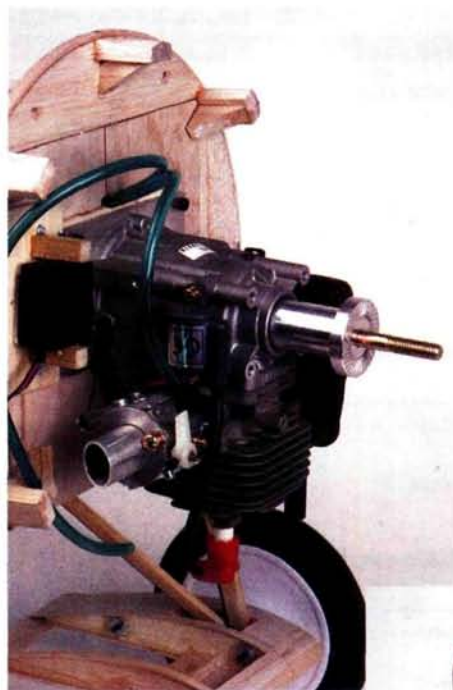
## HIGH-SPEED PERFORMANCE

The G-26 has more than enough power to pull the triplane along at a brisk speed, and with the nose pointing upwards, it seemed as if it could climb forever. I did my full-throttle flying with low rates and found that it flew quite well. With a top speed of about 25 to 30mph, it was a stable, smooth flyer. Don't fly at full throttle with the nose pointing downwards because this puts tremendous pressure on the airframe. High-speed turns require coordinated rudder and aileron inputs.

## AEROBATICS

Coordinated aileron and rudder are required to make the triplane roll satisfactorily. If you roll it with ailerons only, its movements are slow and mushy, and it rotates around the top wing.

The DR.I performs a nice-looking loop from straight and level flight. Some biplanes require a short dive to build up speed before they can do a loop, but this triplane doesn't. The G-26 provides a lengthy vertical climb during a stall turn. Although its aerobatic capabilities are limited, the plane maneuvers very gracefully, and its three wings create a fantastic silhouette in the sky.



The Zenoah G-26 engine is mounted inverted; this allows cooling airflow over the cylinder head. Note that the throttle servo is attached to the firewall to provide a very short throttle-pushrod linkage. Right: how's this for a dapper WW I pilot figure? It's from PerfectPilots.com.



servos. I set the manufacturer-recommended throws, and to balance the plane, I installed 1 pound of lead in the nose. I painted a PerfectPilots.com pilot figure, and after the paint had dried, I installed it and pair of



Here you see the completed fuselage. Notice the plywood doublers in the forward section.

Williams Bros. WW I machine guns. My Fokker DR.I triplane was ready for its first flight.

## CONCLUSION

Balsa USA's 1/4-scale Fokker DR.I is an exciting project that will take a bit more time to complete than your average model, but the

result is well worth the effort. It has created quite a buzz at the flying field—especially when people found out it wasn't an

ARF! If you enjoy building and creating things of beauty, this triplane is for you. ✈

21st Century Fabric; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; [greatplanes.com](http://greatplanes.com).

Airtronics (714) 978-1895; [airtronics.net](http://airtronics.net).

Balsa USA (906) 863-6421; [balsausa.com](http://balsausa.com).

PerfectPilots.com (269) 695-2518.

Williams Bros. Inc. (805) 534-1307; [williamsbrosinc.com](http://williamsbrosinc.com).

Zenoah; distributed by Horizon Hobby Inc. (800) 338-4639; [horizonhobby.com](http://horizonhobby.com).

Zinger; distributed by J&Z Products (310) 539-2313; [zingerpropeller.com](http://zingerpropeller.com).



## *A sleek, 1930s classic*



The Fuji 32 gas engine fits nicely and provides the Rearwin with good power.





**SUPER KRAFT**

# Rearwin Speedster ARF

BY CRAIG TRACHTEN

**W**ith its streamlined, classic looks, the 1930s Rearwin Speedster is a well-designed blend of stability and aerobatic potential, but when it has a 125hp Menasco engine in its nose, it is exceptionally fast. This 1/4-scale version from the engineers at Super KRAFT stays true to its roots; don't underestimate the power and performance of this Golden Age ARF!





#### KIT COMPONENTS

The Super Kraft Rearwin Speedster ARF is extremely well built, and it comes covered with UltraCote in a beautiful scale trim scheme. The package includes all the necessary hardware, and that includes a painted aluminum landing gear and control horns. A painted, fiberglass cowl and wheel pants and an excellent instruction manual round out this impressive package.

#### ASSEMBLY

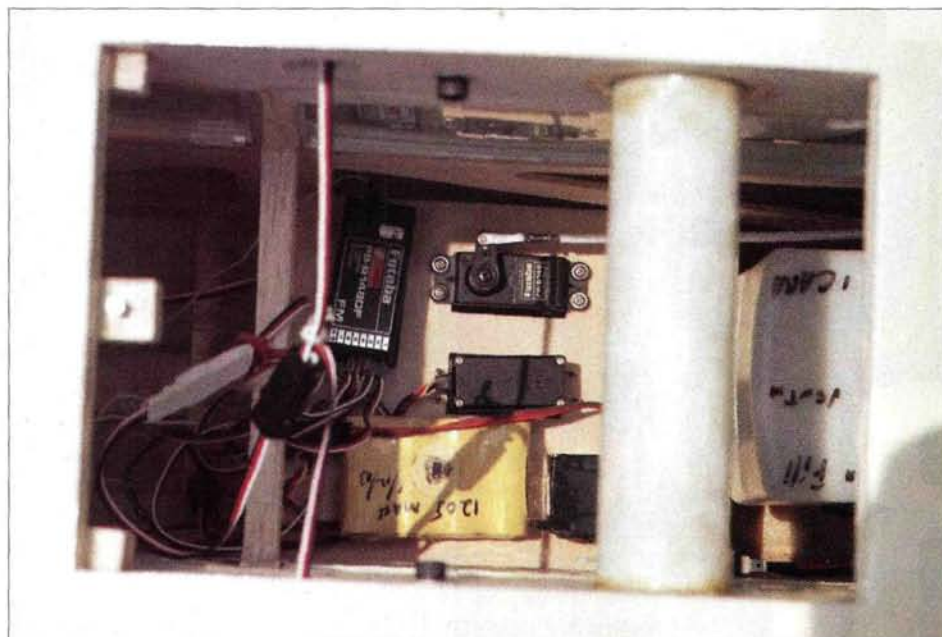
The last thing you want to read in a review is "Glue part A to part B." Suffice it to say that assembling this aircraft is a pleasure. There aren't any surprises: just start on page one, follow the instructions, and soon, you'll be on the last page. Everything fits where and how it is supposed to. I find that building giant-scale models has one big bonus: their fuselages are usually large enough to get your arm in it up to your

shoulder for easy equipment installation, and the Rearwin is no exception. You can also easily access the fuselage interior by removing the top plate or the belly pan.

#### BUILDING HIGHLIGHTS

■ **Fuselage.** Start by attaching the landing gear. The gear will act as a built-in stand, and that comes in handy because the bottom of the fuselage is rounded. Once the horizontal and vertical stabilizers are in place, follow the dimensions pictured in the instructions to find the factory-drilled holes for the functional flying wires. I used a T-pin to prick the covering once I had found the holes. There's nothing complicated about attaching the elevators and rudder; they're attached with CA hinges. I tried Bob Smith Industries' new Insta-Flex hinge glue and was very impressed by the results.

The Rearwin will accept engines from 1.8 to 2.4ci (gas or glow), and I chose a Fuji 32 gas engine. I had to modify the firewall so the engine would fit properly. I removed a section of it to make room for the rear-mounted muffler, but this in no way jeopardized the structural integrity of the firewall. The Rearwin's cowl was one of the easiest to mark and cut I have found on an ARF. With the Fuji 32 mounted, I marked, cut and drilled all of the necessary openings. There's plenty of room to work with here.



No lack of space for the radio equipment here! Note the fiberglass wing tube.





## flight performance

### FLIGHT PERFORMANCE

With the Rearwin, I logged a first! We all have our own superstitions, and one of mine is that I shouldn't fly for the camera. Although I always do my own flight performances, I would never fly for the photo shoot—crazy but true. But due to circumstances beyond my control, I had no choice. I couldn't have had a better aircraft to fly to end my "No flying for the camera" rule!

### TAKEOFF AND LANDING

I fired up the Fuji, checked the control-surface deflections and then taxied around to get a feel for the aircraft. The spring-loaded tailwheel gave me a little trouble on the rough-grass runway, but it wasn't a real problem, especially once the tail came up on the takeoff roll. With the Rearwin lined up on the centerline, I slowly added throttle and some up-elevator halfway down the runway; I released the elevator, and a few seconds later, the Rearwin did a very scale-like takeoff. It was a thing of beauty! As big and beautiful as the Rearwin is, it handles like a trainer. Landings are just as graceful; it slows to a speed that's perfect for landing on my 200-foot runway.

### LOW-SPEED PERFORMANCE

At just over idle, the Rearwin putts around the sky very gracefully. When I stall it, its nose drops without any left or right breaks. Quickly add a little power and up-elevator, and you're on your way. The recommended control throws were good starting points.

### HIGH-SPEED PERFORMANCE

The Rearwin is a joy to fly at high speed. Although the Fuji gasser is on the low end of the displacement range, it's still a good match for the model and hauls it around at a good speed.

### AEROBATICS

The Rearwin will loop and roll with the best of them and does these maneuvers much better than you might expect. Surprisingly, inverted flight was easy to hold with a little down-elevator. I really enjoyed pulling up to a 45-degree climb from level flight and kicking in full rudder. If you can imagine pinning a plane's wingtip to your workbench and using it as a pivot point to turn the aircraft around, that's what the Rearwin does.

If I had to build this model over, I would install a Fuji 50 instead of the Fuji 32. You wouldn't think it, but the Rearwin is quite aerobatic, and the 50's power would be a definite plus.





**Pull-pull cables are used for the rudder. The included bracing wires are easy to install and enhance the tail's strength.**

■ **Wing.** The 2-piece wing slides onto a strong, 1½-inch-diameter aluminum tube, and a couple of cap-head bolts secure them to the tube. I CA'd a flat washer to each screw to spread flight stress over a larger area. The rest of the wing assembly—mounting the servos, hinging the ailerons and making the linkages—goes quickly. The wing struts are attached to a mounting strap on the bottom of the aircraft; they're held on with capscrews and locknuts while the upper parts of the struts use steel clevises that are attached to angled brackets installed in the wing. This allows easy installation and removal when you set the plane up at the field.

■ **Finishing.** It has been a long time since I've used all of a kit's supplied hardware. The Rearwin kit includes high-quality material, and I used all of it except the main wheels and the fuel tank. In fact, I like the control horns so much that I purchased a few extra sets for some of my other aircraft. I changed the wheels because of the rough grass at my flying field and because I prefer to use wheels of a larger diameter. I chose Du-Bro 5-inch wheels, and they fit easily in the wheel pants. As I planned to use the Fuji 32 gas-burner, I swapped the fuel tank for a 32-ounce Sullivan with a gas-compatible stopper. I used Hobbico Command CS-70MG high-torque servos on all the control surfaces and a Futaba 9C transmitter and 148DF receiver. The Hobbico Command servo has become my servo of choice, as I've never had any problems or failures

with it. The AMA requires that gas engines have kill switches to prevent accidental start-ups. If you hook one up to an extra channel of your radio system, you'll be able to stop the engine from the transmitter. Because of the fuselage's stick construction (for a fabric-covered, tube-frame appearance), there wasn't a solid mounting surface for the receiver switch, so I cut a piece of lite-ply and glued it between two stringers. I installed a Great Planes kill switch in the bottom right corner of the windshield.

#### FINAL THOUGHTS

The Rearwin Speedster, like all of Super Kraft's aircraft (I own and fly six of them!) is what all ARFs should be like. They are well built, and the instruction manuals are usually excellent, although this one's construction photos were a little fuzzy. The supplied hardware is topnotch, and that helps make the assembly a breeze. Most enjoyable, though, is the way the Rearwin flies; it really is a gentle giant. Without reservation, I highly recommend this model: it's a good value and well worth your time and effort. ✚

**APC Props;** distributed by Landing Products (530) 661-0399; [apcprop.com](http://apcprop.com).

**Bob Smith Industries** (805) 466-1717; [bsiadhesives.com](http://bsiadhesives.com).

**Du-Bro Products** (800) 848-9411; [dubro.com](http://dubro.com).

**Fuji Engines;** distributed by Great Planes Model Distributors; [fujengines.com](http://fujengines.com).

**Futaba Corp. of America;** distributed by Great

## specifications

**MODEL:** Rearwin Speedster

**MANUFACTURER:** Super Kraft

**DISTRIBUTOR:** Kangke Industrial USA

**TYPE:** giant-scale ARF

**LENGTH:** 75.5 in.

**WINGSPAN:** 96.5 in.

**WING AREA:**  
1,460 sq. in.

**WEIGHT:** 16 lb. 2 oz.

**WING LOADING:**  
25.45 oz./sq. ft.

**ENGINE REQ'D:**  
1.8 to 2.4 glow  
or gas

**ENGINE USED:**  
Fuji 32 gas

**PROP USED:** APC  
16x10

**RADIO REQ'D:**  
4-channel w/6  
servos or 5-channel  
w/7 servos for gas  
engine w/kill switch

**RADIO USED:** Futaba  
9C transmitter,  
Futaba 148DF  
receiver, 5 Hobbico  
CS-70MG servos (aileron [2], elevator,  
rudder, throttle kill switch),  
1 Futaba S148 (throttle)

**PRICE:** \$447.77

**FEATURES:** built-up balsa and lite-ply construction expertly covered in UltraCote; one-piece painted fiberglass cowl and wheel pants; assembled wing struts; functional flying wires; complete hardware set; aluminum landing gear; decals; detailed instructions.

**COMMENTS:** if you are looking for a big airplane that is reasonably priced, looks great and flies even better, the Rearwin Speedster is hard to beat. The model is well-built and covered, and the hardware is of the highest quality. This one is a keeper!

#### HITS

- Painted fiberglass cowl and pants.
- First-rate hardware package.
- Sturdy landing gear.

#### MISSES

- No solid surface to mount receiver switch.
- Fuzzy construction photos.

*Planes Model Distributors; [futaba-rc.com](http://futaba-rc.com).*

*Great Planes Model Distributors (217) 398-6300; (800) 682-8948; [greatplanes.com](http://greatplanes.com).*

*Hobbico; distributed by Great Planes Model Distributors; [hobbico.com](http://hobbico.com).*

*Sullivan Products (410) 732-3500; [sullivanproducts.com](http://sullivanproducts.com).*

*Super Kraft; distributed by Kangke Industrial USA Inc. (877) 203-2377; (631) 274-3058; [kangkeusa.com](http://kangkeusa.com).*









# PREFLIGHT SETUP

**MAKING YOUR MODEL FLY RIGHT**

BY RICK BELL





**Y**ou and your buddy have two nearly identical models. You're using the same engine/prop/fuel and radio equipment, yet his performs better than yours. It flies straighter, is more agile and lands more slowly. Why is there a difference in performance? More than likely, the disparity can be traced back to the building setup and flight-trim adjustments—very important performance aspects that many modelers don't fully understand.

As your plane moves through the air, many forces are acting on it that influence its flight path. The model may look like it's flying straight and level, when in fact it could be yawing slightly and simultaneously climbing or diving a little. Is the yaw issue a rudder-alignment problem or a lateral balance issue? To isolate

and correct the trim problems, many flights must be made, with minor changes made between each. But how and where do you start? I collaborated with my colleagues—senior technical editor Gerry Yarrish and West Coast associate editor John Reid—and we came up with the following flight-trimming steps for optimum flight characteristics.

It takes time to properly trim a model, and the process can be divided into two stages: static trimming and flight trimming. In this article, we'll cover the static-trimming procedure so that your model will be perfectly aligned. In a future issue, we'll get into flight trimming a model and describe what to test for and how to recognize—and solve—any problems that you might encounter.

#### STATIC TRIMMING

What I call "static trimming" all begins on the workbench. If you're building from a kit, you have total control over the model's final outcome. The story is somewhat different if the model is an ARF, as all of the components are already built and covered. Fortunately, though, as you assemble the model, there are steps you can take to ensure that it's properly aligned.

#### WING ALIGNMENT

**Step 1.** Most ARFs are built wing first, and this establishes a good foundation to build from. If your wing is in two panels that need to be joined, it's most important to make sure that they are aligned with each other; the trailing and leading edges should be even. If they aren't, the wing will appear to be warped or twisted, and that will cause the model to roll in flight. If your wing is one piece, sight down its trailing edge, and check for warps; or place a Robart incidence meter at various points along it. Place the meter at each wingtip and take a reading. If the numbers don't match, you'll know it's warped. To remove the warp, twist the wing in the direction opposite to the warp, and apply heat.



*I use a Robart incidence meter to check the wing for warps.*



## PREFLIGHT SETUP

**Step 2.** After you have attached the wing to the fuselage, check for three things:

- Is it centered from side to side?
- Are the wingtips an equal distance from the centerline of the fuselage at the tailpost?
- When viewed from the rear of the model, is the wing horizontal?

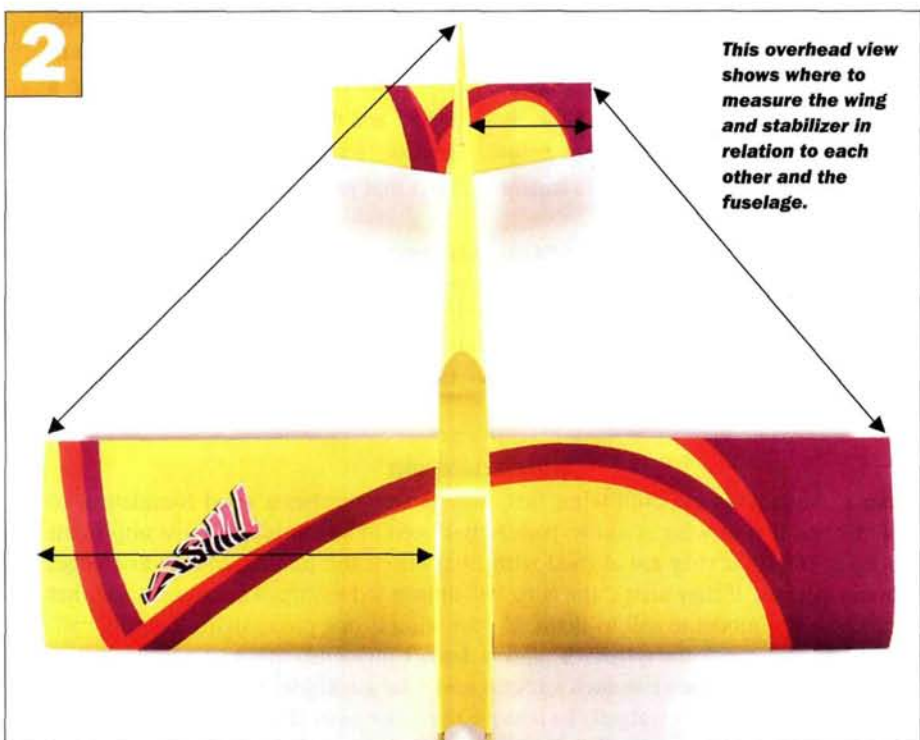
**Step 3.** Check the centering by measuring from the side of the fuselage to the wingtips. Use the same reference point on both sides; the distance to each tip should be the same. If it isn't, slightly enlarge the holes for the wing hold-down dowels in the fuselage and the

boltholes in the wing until you can center the wing.

**Step 4.** Next, take a length of string or Kevlar thread (use something that doesn't stretch under tension) and tie it to a large T-pin. Insert the pin at the fuselage's centerline at the rear and stretch it to a wingtip. Wrap a piece of masking tape around the string, and mark it where the wingtip and trailing edge meet. Swing the string over to the opposite wingtip; if you're lucky, the mark will line up on the corner. If it doesn't, mark it again and measure the distance. If it measures  $\frac{1}{4}$  inch between the marks, for example, you will need to move

the wing by half of that, or  $\frac{1}{8}$  inch. If you enlarged the dowel or the boltholes, fill in any excess gaps with scrap wood so the wing will be in the same position each time you mount it.

**Step 5.** Last, check that the wing is horizontal. With the wing installed in the fuselage, stand several feet behind it and see whether the fuselage leans to one side or the other. If it's crooked, sand the low side of the wing saddle to raise the low wingtip. If the joint between the wing and fuselage is supposed to be 90 degrees, use a 90-degree triangle to ensure that the wing is horizontal.



### SETTING UP THE TAIL FEATHERS

Now that the wing is square and level, you can use it as a reference to align the stabilizer. The stab's alignment process is almost identical to the wing's. First, center it in the fuselage by measuring it at the trailing edge. When it's centered, if possible, stick a T-pin through its leading edge and into the fuselage; this will act as a pivot for the next step.

**Step 6.** Next, equalize the distances from the corners of the wing to the trailing-edge corner of the stab. You can measure a small model with a tape measure or a yardstick, or you can use a length of string. This time, though, if you use string, you'll need to wrap two pieces of masking tape around it. As you did before, mark one piece of tape, stretch the string from stab to wing, and then mark the other piece. Move the string to the other tip and see whether the marks line up. Adjust, if necessary. When the stab tips are equidistant from the wingtips, pin the stab's trailing edge to

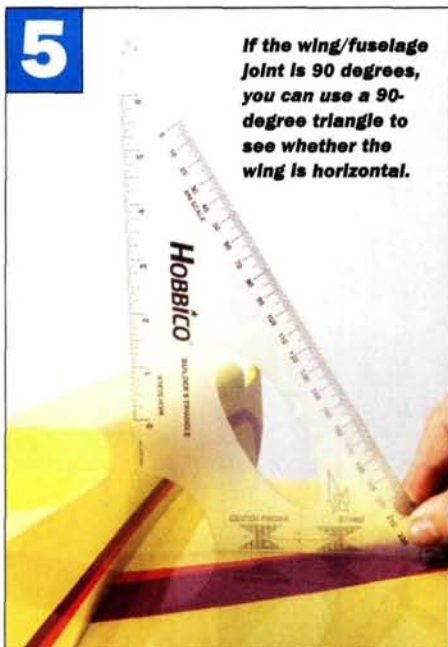


First check the wing to see whether it's centered from side to side.



To see whether the wing is skewed, pin a length of string to the rear of the fuselage. Place a piece of masking tape on the string and mark it. Swing the string over to the other tip; the mark should line up with the tip.





**5** If the wing/fuselage joint is 90 degrees, you can use a 90-degree triangle to see whether the wing is horizontal.

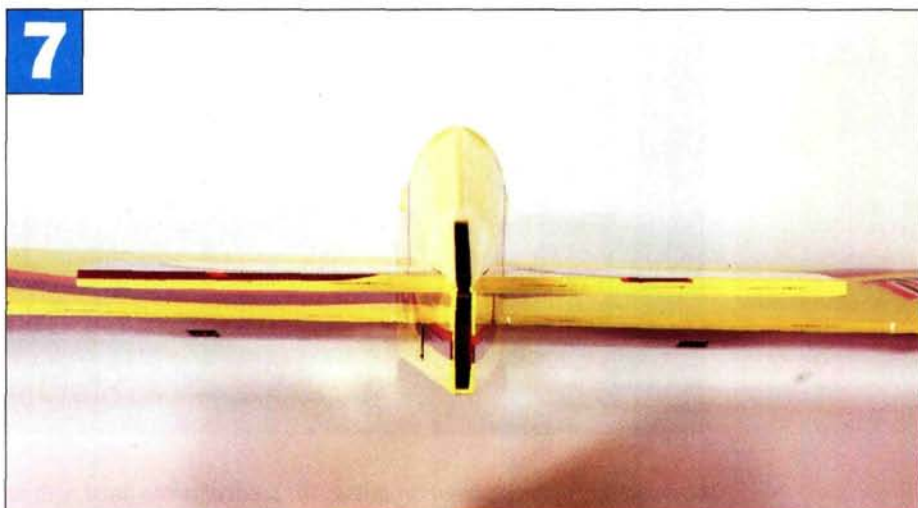


**6** After the wing has been aligned, use it as a reference to align the stab. Center the stab first, and then use string to equalize the distances between the stab tips and the wing.

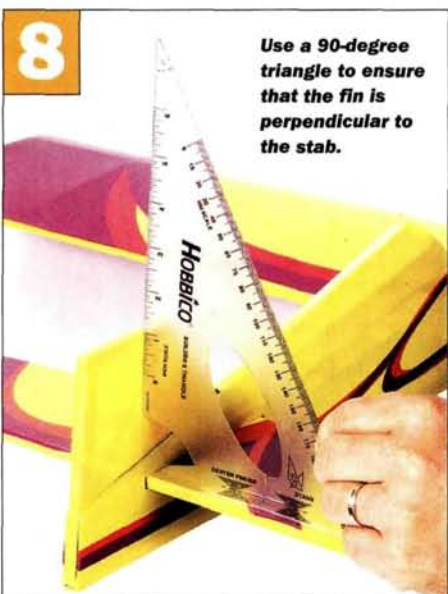
the fuselage, and draw lines on the stab where it meets the fuselage; you'll now be able to position it in exactly the same spot when you glue it into place.

**Step 7.** The last alignment step is to make sure that the stab is parallel to the wing. Again, stand back several feet and sight the model from the rear. If the stab is tilted, lightly sand the stab slot in the fuselage until the stab is level with the wings.

**Step 8.** The vertical fin must be properly aligned and positioned at 90 degrees to the stab. Use a 90-degree triangle to ensure that the fin is perpendicular to the stab (if necessary, sand the fin slot).



**7** View the model from the rear and check whether the stab is parallel to the wing. This stab is tilted slightly, and the slot in the fuselage must be sanded to lower the high stab tip.



**8** Use a 90-degree triangle to ensure that the fin is perpendicular to the stab.



**9** Use a strip of pinstripping tape on top of the fin and down the centerline of the fuselage as a visual reference for alignment.



## PREFLIGHT SETUP

**Step 9.** To see whether the fin is off location, stick a thin piece of tape down the centerline of the fuselage and on the top of the fin. Install the fin in its slot and view it from overhead; then align it with the fuselage's centerline.

### BALANCING THE MODEL

**Step 10.** Before checking the center of gravity (CG), balance the model laterally. If the fore/aft CG has been set, chances are that it will change because the weight that's added to correct the lateral balance won't be exactly on the CG. To laterally balance your model, make a bridle to support the model by its nose and tail, or have a friend hold one end while you hold the other end by the spinner or the prop. Be sure to remove the glow plug from the engine so its compression doesn't prevent the model from tilting. If one wing panel is heavier than the other, it will hang low. Add weight to the lighter wing panel to correct this.

**Step 11.** The model's CG plays a big role in how it flies. Initially, balance the model according to the manufacturer's recommendations. But quite honestly, this represents only a starting point to safely fly it during the first few flights. The Great Planes CG Machine is a very handy balancing tool. It allows very precise CG adjustments, and it balances just about any model. If at all possible, don't add weight to the model to balance it; shift the battery and receiver first.

**Step 12.** A last point before you head to the flying field: seal all of the hinge gaps. Sealing the gaps not only makes the control surfaces more responsive but also makes control-surface flutter less likely. Use clear packing tape or matching MonoKote or UltraCote. The easiest way is to unhook the pushrods from the control surfaces, fold them over toward the top of the flying surface as far as you can and then apply a strip of material along the hinge line. When the control surface is returned to neutral, the gap seal will hardly be visible. At this point, your model is statically trimmed and ready for flight testing.

### SUMMARY

Although preflight setup may sound like a lot of effort, it really doesn't take much more effort than just slapping your model together. And in the end, you'll have a model that's easier to flight trim and more fun to fly! ✈

*Great Planes Model Distributors* (217) 398-6300; (800) 682-8948; [greatplanes.com](http://greatplanes.com).

*MonoKote*; distributed by Great Planes Model Distributors.

*Robart Mfg.* (630) 584-7616; [robart.com](http://robart.com).

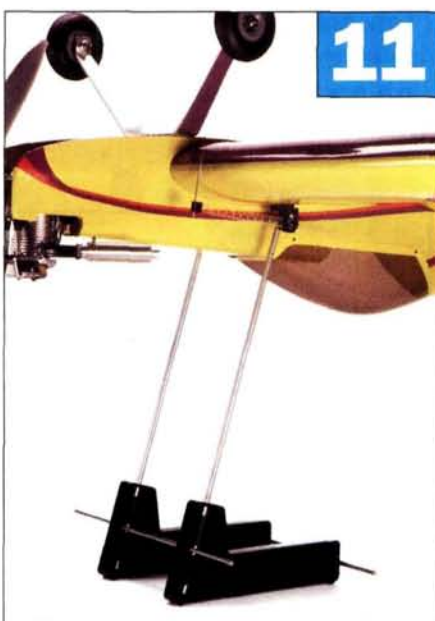
*UltraCote*; distributed by Horizon Hobby Inc. (800) 338-4639; [horizonhobby.com](http://horizonhobby.com).



10



**Laterally balance your model before you adjust the fore/aft CG. Remove the glow plug from the engine, and have a buddy help you. A little weight was needed in the right wingtip to level the wing.**



11

**Use your favorite method to check the CG before attempting to fly your model.**



12

**For best performance, all hinge gaps should be sealed. Clear packing tape works very well.**





# B-26 MARAUDER

## *A hot electric WW II bomber*

by Mark Rittinger

**W**ith its sleek, powerful looks and big, twin Pratt & Whitney radials, the Martin B-26 Marauder has always been a favorite of mine. I decided to build the model after I had several conversations with Roy Siewert, a B-26 tail gunner during WW II. After hearing his stories, I thought it fitting to design, build and fly this electric-powered version of Roy's old bird, "Miss Arkansas."

For the fuselage, I used foam-core construction covered with fiberglass cloth and resin and a fully sheeted, built-up balsa wing structure. Since this design can hardly be considered a beginner's project, I'll cover only the building techniques specific to this model. It's best to avoid adding excessive detail, as this model has a relatively small wing area. Don't add retracts or flaps; they'll make the model too heavy.

### THE FUSELAGE

Because the fuselage and nacelles have complex compound curves, I decided to build them out of pink insulation foam. Cut the cross-section templates from the plans, and then cut the various fuselage sections out of blocks of 2-inch pink foam. Using the templates as a guide, cut the foam blocks into tubular shapes with a hot-wire cutter. Cut each section slightly oversize and sand the blocks to shape. After all the sections have been cut, glue them to the  $\frac{3}{32}$ -inch balsa spine. To keep the structure straight, glue the blocks onto one side of the spine while it's pinned to your workbench. When the glue dries, unpin it and glue the blocks to the other side. Sand the foam to shape.

Mark the wing's cutout area and cut it out carefully. Mark and cut out the stabilizer area. You will also need to cut an opening for the elevator linkages to fit through, and carve out the cockpit area,





## Martin B-26 Marauder—the “Widow-Maker” made good

It's 1943; you're 20 years old and sitting at the end of the runway with your hand wrapped around two throttles that control 4,000hp. You know that fighters like the new P-51 Mustang carry 35 pounds for each square foot of wing area, and they are considered “hot” airplanes. The short-wing Marauder that you're flying, however, carries well over 50 pounds per square foot. In fact, the wings are so short and heavily loaded that your airplane is known as the “flying prostitute” because it has no visible means of support.

In that situation, would you be scared? Of course not! You're 20 years old, remember? Plus, you're immortal. Accidents happen only to other guys. Unfortunately, when the Martin Marauder first went into squadron service, accidents happened to a lot of immortal 20-year-olds.

Unbelievably—after considering the obvious high performance promised by the B-26—the airplane was ordered by the government right from the drawing board; a prototype was never even built. The net result of skipping the usual prototype/testing phase was that the teething problems associated with any new design were worked out by squadron pilots. These young men were taught to fly this startling new airplane by other young pilots who knew little more about it than they did, with inevitable results. The early accidents that marred the airplane's reputation were a function of fielding a high-performance machine that not only hadn't been completely sorted out but also lacked the proper training environment.

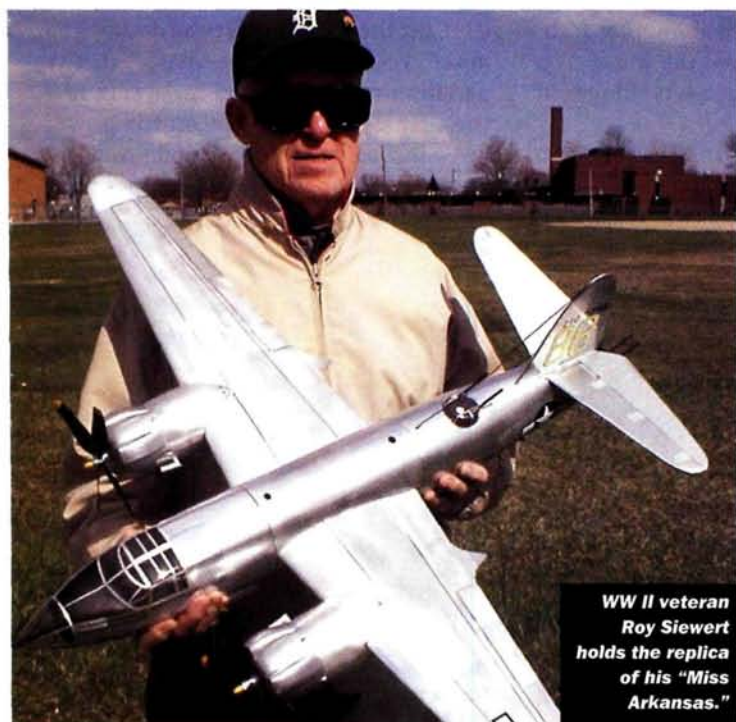
Although the Marauder (so-named by the British) had a shaky beginning, it began to earn its stripes immediately. Put into squadron service in February 1941 (barely three months after its first flights), B-26s were dispatched to Australia the day after Pearl Harbor was bombed. The airplane really earned legendary status, however, after pounding targets in Europe and the Mediterranean.

Although the B-26 was often referred to as a “Widow-Maker,” when the stats were toted up after the War, the Marauder stood at the top of the heap: it had the best combat-survival record of any Allied airplane. Fewer than half of 1 percent of them were lost. It quickly became the airplane of choice—if you wanted to return from a mission.

One B-26, nicknamed “Flak Bait,” flew 202 more missions than any other Allied airplane in WW II. This airplane has been preserved by the National Air and Space Museum in Washington, D.C.

Like the B-25 in the Pacific, the B-26 evolved into a flying-gun platform that eventually carried as many as 12, 50-caliber machine guns, and its young pilots began to strafe targets as if they were flying fighters. Marauders dropped far more than their share of bombs, and the sight of a pair of them chewing up trains and convoys from treetop level became commonplace.

Did the Marauder earn the name “Widow-Maker”? Yes—if you were the enemy. —Budd Davisson Visit Budd on the Web at [airbum.com](http://airbum.com)

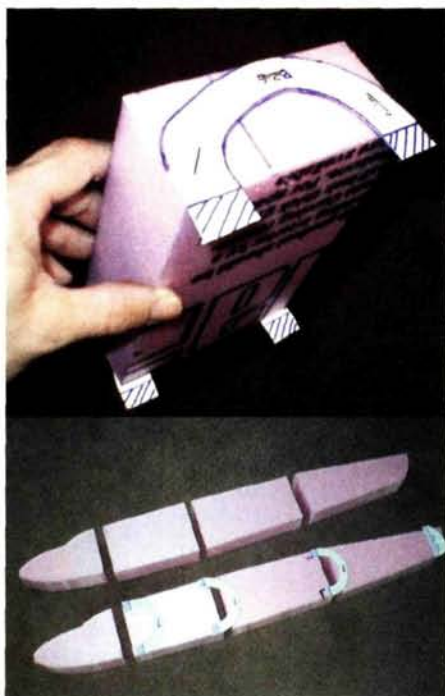


WW II veteran Roy Siewert holds the replica of his “Miss Arkansas.”

the waist-gunner positions and the top turret position. After a final smoothing with fine sandpaper, the foam can be finished with 0.75-ounce glass cloth and Zap Z-Poxy resin. Add a second layer of cloth and resin to the bottom of the fuselage because the model will land on its belly. Sand the cured resin with 400-grit paper until it's smooth. Face the nose bulkhead section with 1/4-inch ply, and do the same to the wing's cutout section and the over-the-wing section. You can now add the cockpit detail. I applied a layer of cloth and resin inside the radio equipment and battery compartment. As shown in the plans, make the wing hold-downs using plywood plates held in place by sections of triangular balsa.

Carve the aft tail block out of balsa, and glue it into place after the stabilizer and control linkages have been installed. You will be surprised by how quickly the fuselage goes together. The canopy, top turret bubble, nose-gunner bubble and tail-gunner blister must be molded. I made my molds out of balsa and simply primed them to produce a smooth finish. Use 0.030-inch clear plastic to form them. (I told you this wasn't a beginner's model!)





**Top and above:** cut the templates from the plans and use them to shape the various foam blocks needed to form the fuselage.



**This half of the fuselage** has been rough cut and sanded to shape. Notice the balsa spine outline.



**The completed fuselage structure** with tail surfaces attached.

### THE WING

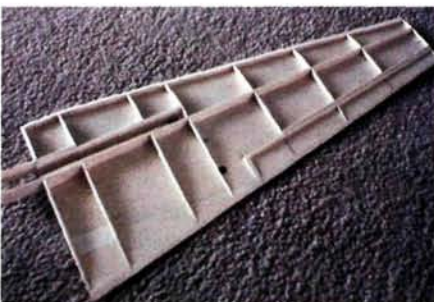
The wing is a simple, flat-bottom affair. It has a few spars and basic  $\frac{1}{16}$ -inch top and bottom sheeting. Begin by gluing  $\frac{1}{16}$ -inch balsa sheets together to make the bottom sheeting. Transfer the rib and spar locations to the bottom sheeting by placing the plans face down over the wood and rubbing acetone over the back of the plans. Glue the leading-edge stock and the spars into place and then glue in the ribs. Add the aileron facings, and sand a taper into the bottom sheeting's

trailing edge. Then sand the leading edge to match the curve of the ribs. Glue the left and right bottom-wing sheeting together with  $\frac{1}{4}$ -inch dihedral under each tip, and then add the  $\frac{1}{8}$ -inch spar doublers. Cut out the openings for the motor wires to run through and mark the corners of the aileron cutouts by sticking pinholes through the bottom sheeting. This will make the aileron cutouts easy to find after the top sheeting has been added. Pin the wing panel to the building board, and prop up the trailing edge at the wingtip using the washout guide shown on the plans. Cut the top sheeting a bit oversize, and glue it into place with slow CA or aliphatic resin. After the adhesive has dried, remove the panel from the board and do the same thing to the other half of the wing. Wrap the wing's center section with nylon or glass cloth and resin to add strength.

You can now cut the ailerons free of the wing. Bevel the ailerons' leading edges to allow free movement when they are hinged back into place, glue on the wingtip blocks and sand them to shape. Sand the leading edges to a nice, round contour and cut a slot in the bottom of the wing panels for the aileron torque rods; small Du-Bro  $\frac{1}{2}$ A aileron torque rods work well. I used 2 Hitec HS-55 servos (one in each motor nacelle) and connected them with a Y-harness. Attach the servos with double-sided foam mounting tape; for a stronger bond, apply a layer of epoxy to the wing surface and let it dry to form a smooth attachment area.

I hinged the ailerons with strips of film covering (using an over-and-under technique) after I had covered the wings. You can use CA hinges or pin-type hinges, if you prefer.

Install the wing on the fuselage and drill holes through the wing and into the hold-down blocks. Attach the wing with two mounting screws. You can glue the upper fuselage section to the top of the wing before or after glassing it.



**The wing structure** is all wood and is fully sheeted. Attach both panels before adding the top sheeting.

## specifications

**MODEL:** B-26 Marauder

**TYPE:** twin scale electric

**WINGSPAN:** 42 in.

**LENGTH:**  $34\frac{1}{4}$  in. (not including tail guns)

**WEIGHT:** 34.5 oz.

**WING AREA:** 225 sq. in.

**WING LOADING:** 22.1 oz./sq. ft.

**RADIO REQ'D:** 3-channel (throttle, aileron, elevator; rudder optional)

**MOTORS USED:**

two 7.2V  
Graupner  
Speed 400s with  
Master Aircscrew  
2.5:1 gearbox

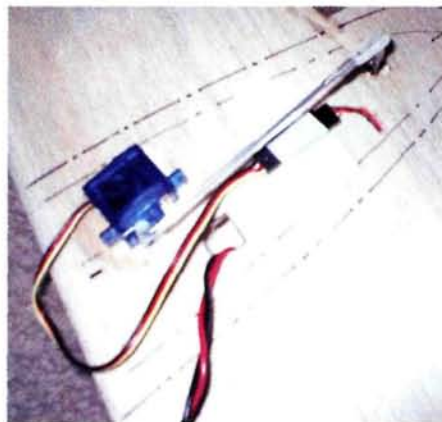
**PROPS USED:** 8x8, 4-blade Megatech P-51 (or Graupner 9x8 2-blades cut to 8-in. diameter)

**BATTERY USED:** 8-cell, 1100mAh NiMH



### THE NACELLES

Make the nacelles out of the same pink foam as the fuselage. Because the nacelles have tapered cutouts to fit the wing's leading-edge sweep, you must cut each of them in left and right sections. Using the side template, cut the minor profile from the foam and glue the nacelle pieces together. Sand to a rounded contour shape, and then hollow them out; leave about a  $\frac{3}{4}$ -inch wall thickness. Hollow out the firewall to the leading-edge section; leave it to add strength. Glue on the plywood firewall facing and make your motor mounts. Fit the nacelles to the wings and make sure that they fit tightly. Fit the motor power wires through the wing troughs and out the front of the nacelles; then epoxy the



**The aileron servos** are in the engine nacelles. This is the servo layout before the foam nacelle has been installed.



## CONSTRUCTION: B-26 MARAUDER

nacelles to the wing. Glue them on straight! Glass the nacelles before or after you glue them to the wing. Add the balsa fillets to the rear of the nacelles and install the balsa engine-cowl mounting blocks. I vacuum-formed the cowls using 0.030-inch plastic and attached them to the nacelles with small sheet-metal screws. You can also make the cowls out of balsa or foam blocks. Cut a few holes for airflow to cool the Graupner 7.2V Speed 400 motors.

### THE TAIL

Simple sheet balsa forms the tail surfaces. The stabilizer halves are glued together with 1 inch of dihedral under each tip. Wrap the center joint with glass cloth and resin. Make a Y-type elevator pushrod to match the two linkages on the elevator halves. Attach the elevator pushrods, feed them through the fuselage cutout and glue the stab/fin assembly to the foam and balsa spine of the fuselage. The fin and rudder (if used) are also made of sheet balsa. I did not use a rudder on the prototype; the B-26 turns well without one.

### COVERING

Sand the glass-covered fuselage with 400-grit paper, and spray it with auto primer. Wet-sand the primer to remove most of it; don't sand into the fiberglass cloth. The aluminum foil tape comes from



**The motor installation is very simple; there is plenty of room inside the engine cowl.**

Harbor Freight. I applied it in scale-size panels (just as it's done on the full-size aircraft). It is very lightweight and conforms well to curves if you burnish it down with pencil erasers. On the nacelles, I applied the tape without a primer coat and applied it directly to the bare balsa wing sheeting. Overlap the tape about 1/16 inch or so, starting at the rear and progressing forward. The fin and stabilizer are covered with tape, but the rudder and elevator are covered with silver MonoKote.

I used Major Decals insignias and Adobe Illustrator artwork and paint for the rest of the "Miss Arkansas" markings. Before you paint, scuff the foil tape with a 3M pad.



**With the wing removed, you can see the wing attachment details and the roomy radio compartment.**

### RADIO AND FINAL SETUP

I used a Castle Creations Pegasus 35P wired to the motors in parallel. Use foam tape to secure the receiver and elevator servo; I used Velcro® to hold the 1100mAh NiMH 8-cell pack in place. Run the antenna outside the fuselage if



**The completed B-26 ready for covering and finishing.**

### TAKEOFF AND LANDING

Line up straight into the wind and give it a hard, level toss. There's plenty of static thrust with the 4-blade, 8x8 Megatech P-51 props. I have also used Graupner Slim 9x8 2-blade props cut to 8-inch diameters. The model performs like the real ship; it likes to be flown fast, so keep her moving through your initial turns.

Landings aren't difficult as long as you keep it lined up into the wind. Don't try to float this one in! Its small wingtips will abruptly stall if you fly too slowly; just grease it in.

### GENERAL FLIGHT CHARACTERISTICS

The Marauder is at home at high speeds. It looks great and performs much better with the throttle all the way forward. The top speed is about



40mph. With direct-drive motors, you'll get higher top-end speed but less static thrust. I like to fly the model in large, lazy circles and figure-8s with a few low-bombing passes thrown in for good measure. Flight times are around 4 minutes. Lithium-polymer cells would add significantly to flight times and save weight.

This is a great-flying little bomber that stands out at the field, both on the ground and in the sky. Have fun!

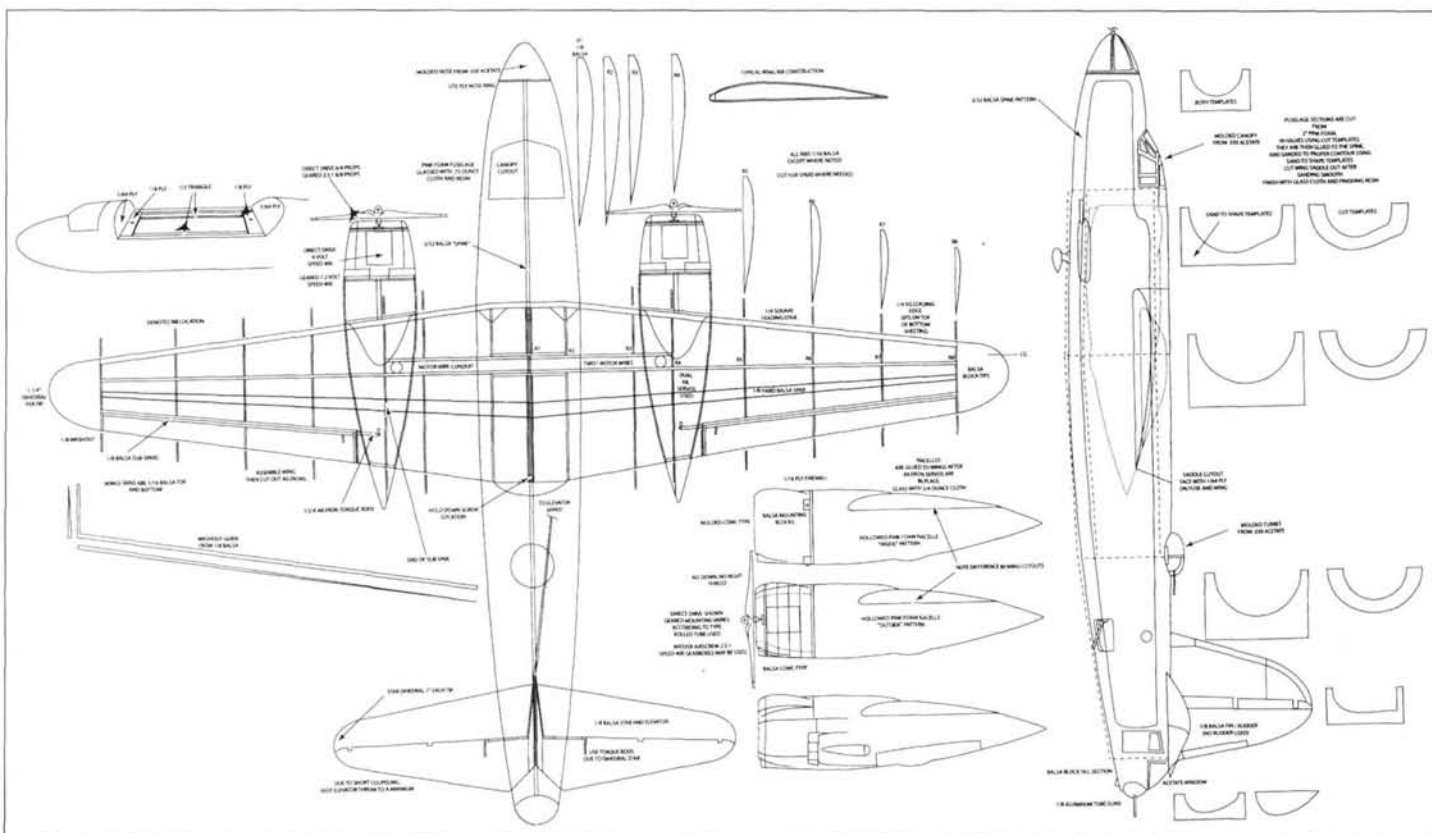


**Almost there! The model has motors, engine cowls, formed canopy and turrets installed.**

you use the metal foil as covering.

Check the control deflections and keep the elevator throws to a minimum. I use just under 3/16 inch of throw on all surfaces, and the model handles well. Check the center of gravity and do a range check with the motors running. The model's final weight is 34.5 ounces, and it flies great! I hope you have fun with your Marauder; I love mine! Just keep it fast!





To order the full-size plan, turn to page 164, or visit [rcstore.com](http://rcstore.com).

### FSP1204 B-26 Marauder

Designed by Mark Rittinger, this is a balsa and foam model for twin geared Speed 400 motors. Foam blocks are carved for the fuselage, and the wing is built up and fully sheeted. Landing gear and rudder are not needed. You have to form your own plastic parts or carve them out of foam.

WS: 42 in.; L: 34.5 in.; power: twin Speed 400 motors; radio: 3-channel; 1 sheet; LD 2. **\$19.95**

Castle Creations (785) 883-4519; [castlecreations.com](http://castlecreations.com).

Du-Bro (800) 848-9411; [dubro.com](http://dubro.com).

Graupner; distributed by Hobby Lobby Intl. (615) 373-1444; [hobbylobby.com](http://hobbylobby.com).

Hitec (858) 748-6948; [hitecrd.com](http://hitecrd.com).

Major Decals; distributed by Northeast Screen Graphics (413) 525-7465; [majordecals.com](http://majordecals.com).

Master Airscrew; distributed by Windsor Propeller Co. (916) 631-8385; [masterairscrew.com](http://masterairscrew.com).

Megatech (201) 662-2800; [megatech.com](http://megatech.com).

MonoKote; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; [greatplanes.com](http://greatplanes.com).

Zap; [zapglue.com](http://zapglue.com). ✦



**FREE!  
PULLOUT  
PLAN****NORTH  
AMERICAN**

# AT-6 Texan

*A zippy electric for racing  
or warbird fun!*

by Nick Zirolì Sr.

**T**he AT-6 Texan was a great advance in military trainer aircraft—a “de-tuned” fighter design that made new pilots’ first steps into combat fighters much safer for them. At full-size warbird gatherings such as Oshkosh, many AT-6s always show up; in fact, the Texan is today probably one of the most available WW II aircraft—so many that a popular Reno racing class was formed. So for color schemes, the sky’s the limit!





## specifications

**MODEL:** North American AT-6 Texan

**DESIGNER:** Nick Zirola Sr.

**TYPE:** semi-scale electric for sport flying/pylon racing

**SCALE:** 1/15 (approximately)

**WINGSPAN:** 32 in.

**WING AREA:** 158 sq. in.

**LENGTH:** 22 in.

**READY-TO-FLY WEIGHT:** 18 oz.

**WING LOADING:** 16.5 oz./sq. ft.

**PROP USED:** 5 1/4x4

**POWER:** Graupner 6V Speed 400 with Airtronics 96333 ES-20 ESC

**NO. OF CHANNELS:** 3 or 4 (aileron, elevator, throttle and optional rudder)

**RADIO EQUIPMENT USED:** Airtronics RD6000 transmitter, Airtronics 92515 micro FM receiver, Airtronics 94091 micro and JR 241 microserves

**BATTERY:** 8-cell, 600mAh Ni-Cd

**FLIGHT DURATION:** 5 min. with Speed 400 motor and 8, 600mAh cells

**COMMENTS:** this little AT-6 likes to fly fast and should not be considered a trainer. It is aerobatic and fun to fly for those with experience.

To order another full-size plan, go to [RCstore.com](http://RCstore.com)





## AT-6 TEXAN

This little Texan is approximately  $\frac{1}{15}$  scale, and I designed it with an eye toward electric pylon racing. I have flown it with a direct-drive Graupner 6V Speed 400 motor and with an Astro Brushless 010, and both allow good performance. All my flying has been done with the model's landing gear in place, so I have flown only off smooth surfaces. If you removed the gear, performance would improve somewhat, but you would then have to hand-launch the model. I'm reluctant to toss the little AT-6 until I've gained more flight time and have it properly trimmed. If you don't use landing gear, you can also eliminate the rudder servo and save some weight; rudder is really required only for ground handling.

I designed the fuselage with rounded formers. It would have been much easier to build it using flat sides, but I felt that this would take too much away from the model's scale looks. Even with its rounded fuselage, the model is not very difficult to put together, and the curved sides are worth the extra effort. The wings are easily built in three sections and use torque wires to move the strip ailerons—again, pretty simple construction.

*There aren't many pieces for the Texan's fuselage. Be sure to dampen the outer surfaces of the sides before you wrap them around the formers.*

*Here's an overview of two wings. Construction is simple and speedy.*

*One completed Texan ready to be covered.*

*The aileron servo installation is easy to get to with the wing removed.*

*The removable canopy provides quick access to the radio equipment.*





We have flown from blacktop and packed-dirt ball-field baselines. The AT-6 tracks well on the ground and is airborne in about 30 feet. Landing should be made on the mains at a fair rate of speed. Wheel landings are preferred. Don't try to drag it in too slowly, or control response may get sloppy in roll. An experienced person who knows how to launch low-wing models should hand-launch the Texan; there's a knack to obtaining the correct speed and launch angle. An underhand launch while holding the sides of the fuselage may be preferred.

This AT-6 likes to fly fast. For a model of this size, it has a fairly high wing loading (16.5 oz./sq. ft.), so take care not to stall it at low speeds.

Control response is good, and it is very stable at high speeds. It does nice rolls and loops. Build up speed before you enter loops, or the model may snap out of the top of the maneuver. I'm trying to say that this AT-6 Texan is not a trainer; it was designed with pylon racing in mind, and it should be flown that way.

Prop choice is pretty important with Speed 400-powered models; we've used 5 $\frac{1}{2}$ x3.5 and 5 $\frac{1}{4}$ x4. So far, the 5 $\frac{1}{2}$ x3.5 has performed best at takeoff. Using the correct prop is very important in obtaining peak performance with the Texan. We still have to do some experimenting with the prop.

Once you have built the model, cover all the parts with a plastic film such as UltraCote or MonoKote. The newer lightweight films such as Lite Film from Nelson Hobby Specialties will help you save a little more weight. There are many attractive military and racing color schemes for the AT-6; just pick up a book and find one you like, or be imaginative and come up with your own colorful design. That's what modeling is all about!

Make the canopy out of soft balsa sheets and blocks and then paint it, or

buy a clear molded one from me; I also offer a molded engine cowl (ordering info is on the plan). Use strips of covering film to trim the canopy framework. Cut the canopy to fit and hold it in place with clear tape or small screws. A small Williams Bros. pilot completes the picture.

Set up the model's control throws as shown on the plan. For an ROG (rise off ground) takeoff, a smooth surface is required. I have used a blacktop

parking lot and a dirt baseball field baseline as runways. If you decide to hand-launch, be sure to have someone with experience make the first launch while you man the transmitter. To launch the model yourself and then get back on the transmitter in time to save a bad throw or correct for poor trim is usually too much to handle. You could easily break your airplane.

So far, two of my little AT-6s have been built and flown. My friend and flying partner Bill Steffes and I have flown the models together around an imaginary pylon course. For such a small investment in time and money, it's great fun. ✦

*Airtronics* (714) 978-1895; [airtronics.net](http://airtronics.net).

*AstroFlight Inc.* (310) 821-6242; [astroflight.com](http://astroflight.com).

*Graupner*; distributed by Hobby Lobby Intl. (615) 373-1444; [graupner.com](http://graupner.com).

*Nelson Hobby Specialties* (877) 263-5766; [nelsonhobby.com](http://nelsonhobby.com).

*MonoKote*; distributed by Great Planes Model Distributors Co. (800) 682-8948; (217) 398-6300; [greatplanes.com](http://greatplanes.com).

*UltraCote*; distributed by Horizon Hobby Inc. (800) 338-4639; [horizonhobby.com](http://horizonhobby.com).

*Williams Bros.* (805) 534-1307; [williamsbroinc.com](http://williamsbroinc.com).



FOR DETAILED  
CONSTRUCTION  
NOTES

**BUILD A  
T-6. GET A  
T-SHIRT**

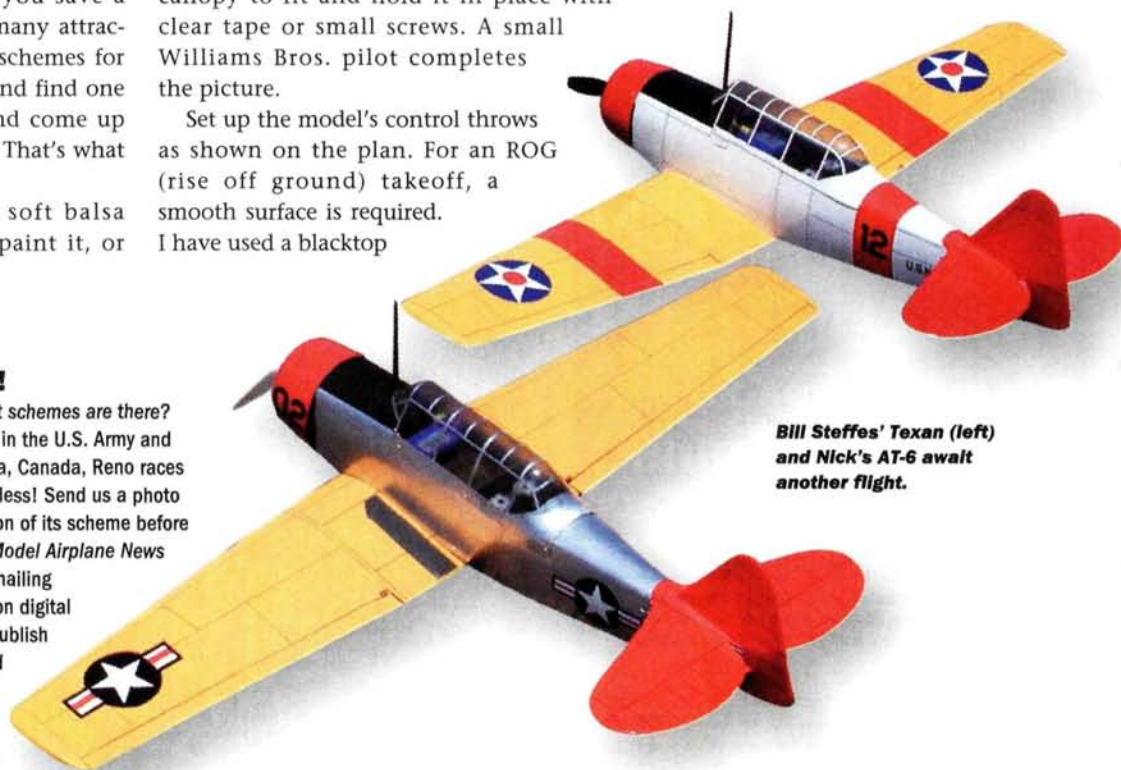
### TEXAN FEVER!

How many Texan paint schemes are there?

Let's see ... they flew in the U.S. Army and Marines, South Africa, Canada, Reno races

... the possibilities are endless! Send us a photo

of your Ziroli Texan and a brief description of its scheme before March 15, 2005, and we'll send you a *Model Airplane News* T-shirt. (Please be sure to include your mailing address!) Color prints and high-resolution digital images are both acceptable, and we'll publish our favorite AT-6s in a future issue. Send your photos to *Model Airplane News* "Texan Fever," 100 East Ridge, Ridgefield, CT 06877-4606 USA, or email us at [man@airage.com](mailto:man@airage.com). Enjoy!



**Bill Steffes' Texan (left)  
and Nick's AT-6 await  
another flight.**



# B.H. HANSON 260

**A MODIFIED ZENOAH G-26 LIGHTER, MORE POWER!** *by Bruce Smith*



The Hanson 260 is a modified version of the standard Zenoah G-26. The electronic ignition improves performance and reduces weight.

## ENGINE HIGHLIGHTS

- Lighter than stock engine.
- Starts easily.
- Has an internal ignition system.
- Fits G-23 mount pattern.

## specifications

- ENGINE:** Hanson 260  
**DISTRIBUTOR:** B.H. Hanson  
**TYPE:** 2-stroke, piston valve, gasoline  
**DISPLACEMENT:** 1.6ci (25.1cc)  
**BORE:** 1.33 in. (34mm)  
**STROKE:** 1.10 in. (28mm)  
**OUTPUT:** 3hp@9,000rpm (no muffler)  
**LENGTH:** 7 $\frac{1}{16}$  in. (overall); 5 $\frac{1}{16}$  in. (to face of prop hub)  
**HEIGHT:** 6 $\frac{7}{8}$  in.  
**WIDTH:** 7 $\frac{1}{4}$  in. (with velocity stack and standard muffler)  
**WEIGHT:** 44.9 oz.  
**WEIGHT WITH STOCK MUFFLER:** 50 oz.  
**IGNITION TYPE:** electronic ignition (battery required)  
**SPARK PLUG:** 10mm Champion RZ7C "resistor"  
**PROP SHAFT:** stud type, 8mm  
**PRICE:** \$385

**FEATURES:** the engine includes electronic ignition; an attached aluminum mounting plate; a velocity stack; a spark plug and plug wrench; and a battery wire harness.

**COMMENTS:** the B.H. Hanson 260 is a great performer with a well-executed electronic-ignition conversion by Ralph Cunningham of RC Ignitions. The engine is even easier to start, and the additional power and weight savings derived from the ignition modification are great news for lovers of gasoline engines. The engine mounting-bolt pattern is unchanged, so the 260 is a drop-in engine switch for any model powered by the stock Zenoah G-23.

find that one of the most interesting aspects of the human condition—particularly the male human condition—is the need to wrench, tinker, tweak, finesse and beat more performance out of our inventions, regardless of what those inventions are. The B.H. Hanson 260 is no exception. This Zenoah G-26 with an electronic-ignition modification takes the already outstanding performance of a 1.6ci gasoline engine and moves it up a few more notches. You may ask, "Why mess with it?" To answer that, you have to understand Bruce Hanson, who is responsible for the research and development of the G-23 "marine" gas engine.

The B.H. Hanson Co. of Las Vegas distributes Zenoah G-23 marine, helicopter and G-26 aircraft engines and several G-23 high-performance marine and heli modification kits. Hanson's experience with the G-23 is unparalleled, and the company isn't losing ground on the G-26 now that it is here! B.H. Hanson is also a certified Zenoah parts and repair house.

Enter the Hanson 260 electronic-ignition engine. The man behind the conversion of the G-26 is Ralph Cunningham of RC Ignitions. Ralph has been converting magneto (CDI) engines to electronic-ignition engines for the past 16 years. In addition to his knowledge and experience with RC ignition engines, Ralph is passionate about building the highest-performance engines

known to the hobby, including big-bore Herbranson and Quadra-Aerrow 200s used



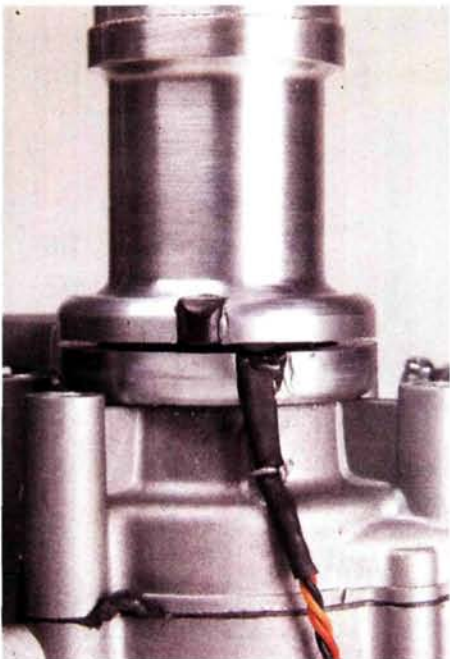


**Left: the battery-wire harness is plugged into this jack on the side of the engine. You must supply an arming switch or simply unplug the wire to prevent accidental starting. Right: the electronic-ignition module is in the space where the stock flywheel was. An aluminum cover plate keeps it safe.**

in Unlimited class races for Unlimited Scale Racing Association events.

As I mentioned in my review of the stock Zenoah G-26 (February 2004 issue), the G-26 produces power way up on the rpm curve. The factory shows the G-26 torque curve cresting at 9,000rpm. The Hanson 260 makes more rpm and squeezes a bit more torque out of the same engine with no internal modifications.

The 260 benefits greatly from Ralph's electronic-ignition system. It completely eliminates the flywheel and magneto—nearly 10 ounces for the pair—and uses the stock coil, a very reliable and high-quality standard in the Zenoah engine family. All that is required to run the engine is a battery pack and a kill switch. The omission of the stock engine parts reduces the engine



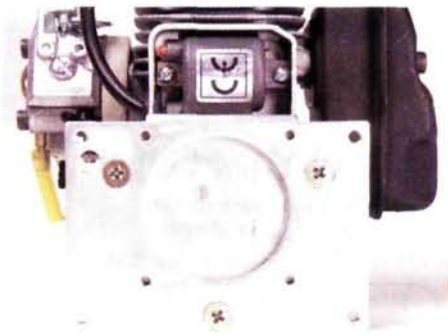
**The prop hub has also been modified to house the ignition system's magnetic pick-up that fires the spark. The timing advance at full power is 28 degrees BTDC; for starting, it is set at 0 degrees BTDC.**

weight from 54.6 to 44.9 ounces (without the muffler and battery).

The ignition system is comprised of a small circuit board, a machined collar with timing pick-up behind the propeller's extension hub and a few new wires. Because the stock aluminum backplate mount has a 2-inch-diameter hole in it, the 260 uses a lightweight aluminum cover plate installed on the interior side of the mount that covers the opening where the flywheel used to be. Because the flywheel has been eliminated, the stud end of the crankshaft that normally holds it has been ground off. The flywheel void now houses the ignition board, which is mounted on the inside of the new cover plate. The engine also has a 3-bolt safety prop hub that uses an 8mm bolt instead of a standard prop hub with a 6mm stud.

The new electronic ignition requires a 500mA, 4-cell AA battery pack to produce a spark. Although the elimination of the CDI parts sheds nearly 10 ounces, the modest addition of a few bits and pieces along with a 3.4-ounce battery pack restores a fraction of the weight savings. Ralph states that the ignition's energy consumption is nearly a steady 200mA draw, which provides more than 2 hours of running time per battery charge! That's much more time than I've seen the average modeler fly at the flying field.

The timing of the 260's electronic ignition is set at a maximum advance of 28 degrees before top dead center (BTDC). For starting, the timing is automatically set to 0 degrees BTDC. The Hanson 260 is as easy (if not easier) to start as the stock G-26. The brand-new test 260 ran immediately after priming. Subsequent starts were "first flip." Very nice!



## PERFORMANCE EVALUATION

Without a doubt, there is something good cooking with the Hanson 260. The most impressive data is the nice rpm increase as exhaust restriction is lessened and the nearly equal improvement in thrust that ranges the span of propellers tested.

Although the Hanson 260 opens up the rpm envelope, the engineering of this unique 1.6 gasoline engine still stakes its claim in the 9,000rpm range. And although the approximate 1,000rpm increase in open-port performance that divides the stock and Hanson 260 engines is striking, the tests suggest that most of the "pulling" power still lives in a lower range (good news for you IMAC and fun-fly folks). For you speed demons, just throw on a Hanson tuned pipe and header and go for it; I'm sure the Hanson G-26 will twist the starch out of small-diameter, high-pitched props.

For certain, the modified G-26 substantially opens up the range of propeller choices while providing excellent thrust performance for a gas engine of its size. At 44.9 ounces—minus battery and muffler—I think you'll find this engine extremely accommodating, regardless of your intended use. The choice is yours! ✚

*Abell Hobby & Mfg. (406) 259-4882; abellrc.com.*

*APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.*

*B.H. Hanson (702) 436-4422; bhhanston.com.*

*Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.*

*Mejzlik; distributed by Desert Aircraft (520) 722-0607; desertaircraft.com.*

*RC Ignitions (928) 635-2455; rcignitions.com.*

*Zenoah; distributed by Horizon Hobby.*

## PROPS & PERFORMANCE

Propeller and muffler choices can affect your engine's performance. The chart below shows the results obtained when using props of various sizes with two different mufflers.

### Standard Zenoah muffler with 2, 3/8-in.-i.d. outlets

Prop	APC 16x8	APC 17x6	APC 17x8	APC 18x6W	APC 18x8	Mejzlik 18x8
dB	99	99	99	99	97	96
Rpm	9,120	8,970	8,160	7,800	7,380	7,260
Thrust (lb.)	13	15	13.5	14	12.5	14.5

### Abell Hobby muffler with 2, 1/2-in.-i.d. outlets

Prop	APC 16x8	APC 17x6	APC 17x8	APC 18x6W	APC 18x8	Mejzlik 18x8
dB	104	103	102	100	100	97
Rpm	9,840	9,780	8,940	7,950	7,830	7,830
Thrust (lb.)	16	16.75	16.5	16.5	14.5	16.5

Best combo for thrust vs. dB: Abell Hobby muffler with Mejzlik 18x8



# HITEC OPTIC 6

**AN AFFORDABLE, EASY-TO-USE, 6-CHANNEL  
COMPUTER RADIO SYSTEM** *by Gerry Yarrish*



*Hitec's new Optic 6 is a 6-channel computer radio with an eight-model memory.*

## SYSTEM HIGHLIGHTS

- 6 channels with eight-model memory.
- Aircraft, glider and heli programming.
- Easy menu navigation.
- Auto trim screen.
- Works with Spectra synthesized frequency module.

## specifications

**PRODUCT:** Optic 6 transmitter  
**MANUFACTURER:** Hitec RCD  
**TYPE:** 6-channel with eight-model memory  
**MODULATION:** PPM (FM)/QPCM selectable  
**FREQUENCY:** 72MHz  
**RECEIVER:** Hitec HFD-08RD 8-channel FM  
**TYPE:** dual conversion, ultra-narrowband  
**OPERATING VOLTAGE:** 4.8 to 6  
**SIZE:** 2¼x1¾x1⅜ in.

**SERVOs:** Hitec standard HS-325HB  
**MOTOR TYPE:** 3-pole ferrite  
**BEARING TYPE:** ball bearing (top)  
**SPEED (SEC.):** 0.19 (4.8V)/0.15 (6V)  
**TORQUE (OZ.-IN.):** 42 (4.8V)/51 (6V)  
**SIZE:** 1.6x0.8x1.4 in.  
**WEIGHT:** 1.51 oz.  
**SYSTEM PRICE:** \$209.99 (basic)

**FEATURES:** 6 channels, eight-model memory, FM/Q-PCM, Spectra-module-compatible, digital trims, model-name input, dual-timer function, assignable switch location, EPA, dual rates, exponential, QPCM fail-safe feature, throttle lock, engine cut, three flight modes, two open mixes, gyro gain control, throttle and pitch curves, revo and CCPM mixing, crow mixing, camber and reflex mixing.

**COMMENTS:** The Hitec Optic 6 comes with 4 HS-325HB ball-bearing servos, 8-channel receiver, 600mAh airborne battery pack and switch harness, overnight battery charger, 12-inch servo-extension lead, servo hardware, flight-preserver foam pad, manual and warranty card.

**T**he new Optic 6 FM computer radio system from Hitec is a welcome addition to the 6-channel radio market. This radio offers powered-aircraft, glider and helicopter programming, eight-model memory and, best of all, it costs less than \$210! Now that I have your attention, let's take an up-close and personal look at this impressive system.

The Optic 6 radio system in this review is the standard version that comes with 4 HS-325HB servos, an 8-channel HFD-08RD receiver, a 600mAh 4.8V airborne battery pack, a switch harness and an overnight battery charger. Also included are radio-frequency antenna numbers and flag, additional servo wheels and mounting hardware, a 12-inch aileron servo-extension lead and a square piece of Hitec flight-protector foam to wrap around the receiver.

This radio is also available with a PCM receiver, and it can be ordered with a Spectra frequency synthesized module (see "Spectra freedom!" sidebar).



## TRANSMITTER

The Optic 6 transmitter has a nicely molded case, and the sealed stick gimbals have a smooth feel. The four main functions (rudder, throttle, aileron and elevator) have digital trims; when you activate them, the main display screen automatically switches to the trim display. There, you can see the control output number and adjust the trim percentage in the + or - direction.

At the case's top corners are two long toggle switches: the trainer switch is on the left, and the flight-mode switch is on the right. The engine-cut button is also on the right side. On the right upper front corner is the aileron dual-rate switch, and the elevator/rudder dual rate and the auxiliary channel/gear switches are on the left. On each side of the radio is an auxiliary-channel slider switch. The power

on/off switch is centered just above the main display screen. Above the neck-strap's clip fitting is a blue power-on indicator light.

On the left side of the display screen are two edit buttons and two cursor buttons. At the right of the screen are two data input buttons and the lock and clear buttons. These eight buttons allow you to easily navigate the radio's programming and adjust the various functions. On my first try, I found the radio's layout very comfortable and the programming choices intuitively configured.

The channel outputs are aileron (1), elevator (2), throttle (3), rudder (4), landing gear/aux. 1 (5), flap/aux. 2 (6).

## PROGRAMS AND MENUS

There are two "model-type" menus to choose from: aircraft/glider (ACGL) and helicopter

*The transmitter case is well laid out, and everything is easy to reach. The trainer switch, the rudder/elevator dual-rate switch, auxiliary-channel/gear switch and the side slider switch are in the upper left corner of the unit.*

(Heli). The ACGL program includes flap-aileron (dual-aileron servos), flap trim, camber control, landing mixing and settings, aileron differential, ailelevator (dual-elevator servos), V-tail, elevon (flying-wing models), throttle cut, throttle-control select, aileron-to-rudder mixing, elevator-to-flap mixing and crow mixing.

The Heli features include five-point pitch and throttle curves, high and low revolution

## MODEL SETUP MENU

To access the setup menu, simultaneously press and hold both of the edit keys and then turn on the radio. By using the cursor buttons, you can select the various functions and adjustments you want for your model. Your choices include:

- Select the model memory you want (eight memories available).
- Assign a model name (four letters and two numbers).
- Select the model type (ACGL or Heli).
- Adjust swashplate type (Heli only).
- Copy a model memory.
- Adjust the transmitter's frequency shift (positive or negative) so it can be used with other brands of receivers. Hitec radios use negative shift.
- Select the modulation type (PPM/FM or QPCM). The fail-safe feature works only in QPCM.
- Select from mode 1 and mode 2 control setup.
- Select and adjust the timer functions (two available).
- Use the reset function to clear a model memory.



*The upper right corner of the radio has the three-position flight-mode switch, the engine-cut button, aileron dual-rate switch and a side slider switch.*





The HFD-08RD comes with the basic Optic 6 system. You can also get a PCM receiver.

mixing, throttle cut and hold, gyro settings, rudder-to-throttle mixing and four flight modes. You can also select conventional swashplate or more complex mixing for 3-servo, 120-degree CCPM swashplate control.

#### TRANSMITTER DISPLAYS

When you first turn on the radio, the screen shows the model type (ACGL or Heli) and then switches to the start-up screen that shows the voltage/timer display. It also shows the current model number with a small arrow. The edit buttons allow you to scroll through the voltage/timer, model-name and trim-position screens. Pressing the right cursor button brings up the timer display that shows the stopwatch time on the left and radio-on time at the right. The cursor buttons are used to start and stop the stopwatch timer, and the clear button resets the radio-on time.

The lock switch is a safety feature that locks the throttle in the last position it was set in. This ensures that the throttle is not accidentally advanced while you are carrying your running model. There are three warning displays: one is for low-battery voltage, and the two heli-specific warnings are idle on and throttle hold on.

#### FLIGHT MODES AND MIXING

A valuable feature on any computer radio is a flight-mode switch that can be used to automatically configure your model for various conditions. The flight-mode switch (SW 4) on the Optic 6 has three positions, and by using the menus, you



The HS-325HB servo is standard equipment. It produces 42 oz.-in. of torque.

can turn the landing mode on by moving the flight-mode switch aft (toward you). Moving it fully forward (away from you) activates the elevator-to-flap mixing. The center position turns both functions off. The crow is actuated by the gear switch (SW2).

By using programmable mixing menus 1 and 2, you can adjust the programming for knife-edge flight (where roll and pitch coupling can be dialed out) and for any other combination of control functions. Coupled with the radio's switch-selection function, you can customize your radio to best fit your control needs.

With its many popular functions, an easy-to-understand menu of options and a big, easy-to-read display, the Optic 6 from Hitec is a good place to start exploring the realm of computer control and flexibility. ✚

## FUNCTION MENU

To enter the function menu, first turn on the radio and then press both edit keys at the same time. The menu includes:

- EPA** Endpoint adjustment (with servo travel from 0 to 125 percent)
- D/R** Dual rates (elevator, rudder and aileron from 0 to 125 percent)
- EXP** Exponential
- STRM** Subtrim for adjusting servo center point
- REV** Servo travel reversing
- T.CUT** Throttle cut engine shutdown
- STCK** Throttle control location
- FLPT** Flap travel
- FLPN** Flaperon (combination flap/aileron function)
- ADIF** Aileron differential
- CAMB** Camber (combination flap/aileron function)
- LAND** Landing function (select aileron/flap presets)
- ELVN** Elevon mixing (flying wing/tailless aircraft)
- VTAL** V-tail mixing (rudder/elevator combination)
- A->R** Aileron-to-rudder mixing
- E->F** Elevator-to-flap mixing
- CROW** Proportional airbrake function using flaps and ailerons

- PMX1-2** Programmable mixer 1 and 2
- S/W SEL** Switch selection (A->R, E->F, CAMB, and CROW functions)
- AILV** Ailevator (dual-elevator servo setup required)
- FAIL** Fail-safe position input menu (QPCM)

For all menu screen displays, the various perimeters and related symbols are displayed; the edit, cursor and data + and - buttons allow you to navigate and input the changes and selections you wish. Choices can include percentage increase and decrease and function activation or inhibit.



The main display is large and easy to read. The eight buttons used to enter, navigate and make changes to the programming menus are easy to access and use.

## SPECTRA FREEDOM!

The Hitec Spectra module fits the Hitec Prism 7, Eclipse and new Optic Series of transmitters; it has a street price of \$84.99. Measuring roughly 1½x3¼x2¼ inches, the module is plugged right into the transmitter's RF module port in the back of the case and allows you to select any of the 50 72MHz channels from 11 to 60.

To change channels, simply use a small screwdriver to adjust the small dials on the side of the module in the channel you want to use, and plug the module into place. No more waiting for your frequency to become available at a crowded flying field! It's quick and simple.



The Spectra synthesized frequency module is completely compatible with the Optic 6.



# Convert the Great Planes Little Toni to E-power

by Greg Covey



*This quiet racer has great performance*

**W**ith its streamlined design, wide performance envelope, one-piece fiberglass fuselage and racer wing, the Great Planes .61 Little Toni ARF just begs to be converted to clean, vibration-free electric power. This power swap doesn't involve any re-engineering or deviation from the standard ARF assembly other than adding some cooling holes.

I decided to use the Kontronik brushless 600 power system in the Little Toni. Kontronik systems are "plug and play" and come with matched components to eliminate the guesswork of choosing the right parts to power your model. These high-efficiency brushless motors and matching electronic speed controls (ESCs) also come with premounted gearboxes that allow you to use larger props.

The 600 set comes with a Jazz 55-10-32 ESC and a 4.2:1 gearbox. This ESC has a maximum sustained current rating of 55 amps and is intended for use with 10 to 32 Ni-Cd or NiMH cells or 3 to 9 Li-poly cells in series. When you use the highest cell count, this 600-size brushless motor can even outperform a .61 glow engine!

Instead of using a typical receiver battery to power both the receiver and servos, I used a Kool Flight Ultimate Battery Eliminator Circuit (UBEC). This new 6V output unit speeds up your servo responses and makes them stronger—a great advantage for high-speed pylon racing! The UBEC is about 1/3 the

weight of a 5-cell receiver pack and draws power from the main flight pack. If your receiver doesn't have enough channel connectors to accommodate the circuit output cable, you can connect it in parallel with any channel using a Y-adapter cable. The UBEC can supply enough power for a receiver and up to 9 servos.

## MOTOR INSTALLATION

Converting the Little Toni to electric power was easy; I simply mounted the Kontronik motor onto the engine mount using two 2 3/4-inch steel hose clamps from a home-improvement store. To ensure a slip-free mount, I wedged a piece of emery board between the motor wall and the engine-mount post. To force the motor to follow the built-in right thrust angle of the firewall, I inserted two short plywood pieces on the right-hand side. It was easy to get a perfect motor-shaft alignment because the fiberglass cowl fits over the nose in a fixed, keyed position. This allowed me to test the position of the motor many times by press-fitting on the cowl and then the prop-adapter assembly with the aluminum spinner backplate before completely tightening the hose clamps. After I had tightened the two hose clamps, I was able to pick up the entire fuselage by holding only the clamped motor.

The motor is cooled in flight by the stock cowl openings and the air scoop that's built into the Little Toni design. I drilled evenly spaced holes into the firewall so that air can flow into



the cowl and through the firewall holes to cool the battery and ESC. I also made an air exit in the bottom side of the fuselage just aft of the wing saddle. I used two, 1-inch plastic Master Flow Circular Louvers from Home Depot.

I positioned the motor to allow the MP Jet 6mm prop adapter about 1/4-inch clearance for the aluminum spinner. The prop adapter has an 8mm output shaft that will mate with the spinner adapter. The thread spacing was not exactly the same but was close enough to work well. The stock aluminum spinner looked great when mounted! Unfortunately, after a few flights, I had to replace the stock spinner with a 3-inch red C.B. Associates spinner; using the prop adapter for the electric motor caused too much vibration.

### BATTERY OPTIONS

My initial setup for the Kontronik 600 motor used 20 Sanyo CP2400 Ni-Cd cells. When using an APC 14x7 e-prop, I drew about 41 amps and later switched to a 14x10 prop that drew 51 amps. This setup flew incredibly well!

I could replace the 44-ounce, 20-cell CP2400 Ni-Cd pack with 8 Electrify 1500mAh Li-poly 3-cell packs (6s4p, or four parallel sets of two, 3-cell packs in series) to provide a comfortable current delivery of 50 amps.

Since each pack can deliver a continuous current of 12 amps, four packs in parallel could deliver 48 amps continuous current with a peak delivery of more than 60 amps! This super pack would have 6000mAh capacity, which would have 2.5 times the flight duration of the 20-cell Ni-Cd pack. Further, the super-lithium pack would weigh only about 32 ounces—that's a 12-ounce drop in flying weight! This incredible gain in electric flight performance is a cost tradeoff.

### FINAL ASSEMBLY

I mounted the two 10-cell Ni-Cd packs in the front half of the fuselage so that the ends of the packs touched the back of the firewall. I connected the two packs in series using a portion of an FMA Series Connector Module. I taped the packs together and rested them in the frame of the plywood former just behind the firewall. Small pieces of wedge-shaped, high-impact foam hold the pack in place. I also cut a piece of foam to fit in the fuselage with an opening in the middle for the rear of the two packs to stick through. This held them firmly in place for added security during maneuvers in flight.

I used a Tower Hobbies System 3000 on/off switch in-line between my UBEC 6V output and the receiver. This extra switch keeps the motor and servos off when I initially connect the ESC plug to the battery pack, so I can walk my plane from the pits to the runway before enabling the receiver with the switch. For added safety, I always turn my transmitter on before I connect the power plugs and make

## specifications

**MODEL:** Little Toni 60 ARF

**MANUFACTURER:** Great Planes Model Mfg.

**WINGSPAN:** 63 in.

**LENGTH:** 56.5 in.

**WEIGHT:** 9.25 lb.

**WING AREA:** 775 sq. in.

**WING LOADING:** 27.5 oz./sq. ft.

**MOTOR USED:** Kontronik brushless 600 geared 4.2:1 w/Jet 77 Opto ESC

**BATTERY:** 20-cell, 2400 Ni-Cd pack

**PROP:** APC 14x10 electric

**CURRENT DRAW:** 51 amps

**TOP RPM:** 8,500

**POWER:** 1,080 watts (116 watts/lb.)

**DURATION:** 7 to 8 min.

**RADIO REQ'D:** 4-channel w/5 servos

**RADIO GEAR USED:** Futaba S3004 servos, Futaba R127DF receiver

**PRICES:** \$250 (Little Toni); \$240 (Kontronik 600 brushless motor); \$190 (Jet 77 Opto ESC)

**COMMENTS:** when the Little Toni is powered by a Kontronik brushless 600 set, it will have exceptional performance that will keep this scale model looking brand-new for a long time.



The Kontronik Brushless Set 600 comes with a Kontronik Jazz 55-10-32 ESC and a premounted gearbox with a 4.2:1 reduction ratio.

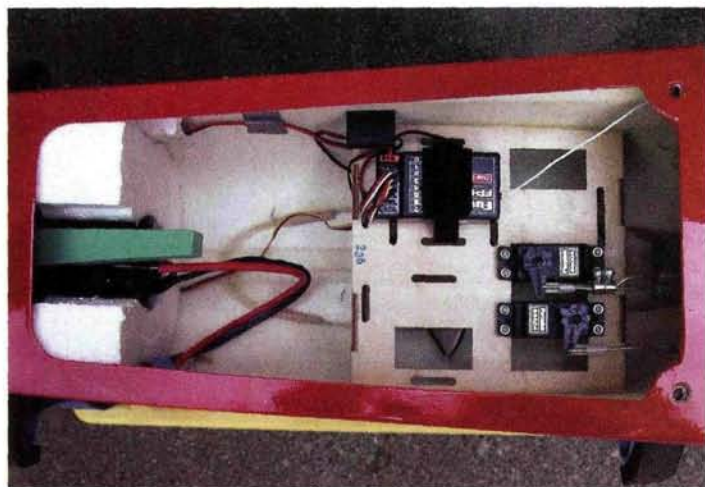
sure that the throttle stick is down. These high-power, 600-size brushless motors can deliver more than 1,000 watts of power to the prop, so always handle them safely.

My plane balanced perfectly at the recommended stock CG setting of 3 3/8 inch back from the leading edge of the wing measured at the fuselage. I used the Great Planes CG Machine for an accurate measurement. When setting the control throws, I used a ruler to adjust the swing per the chart in the manual.



The fiberglass cowl fit perfectly over the fuselage. The electric motor was positioned to match the built-in right thrust line and to allow the MP Jet 6mm prop adapter about 1/4-inch clearance for the aluminum spinner.





**I outfitted the Little Toni with Futaba servos and receiver and a Tower Hobbies on/off switch.**

I also reprogrammed the Kontronik Jazz-55 ESC for Mode 3, which disables the brake and under-voltage cutoff. Neither of these features is needed, and they can also be annoying on larger-scale airplane models, since you can easily detect the power loss in flight. The sudden shutdown of the prop in flight often affects maneuverability in a bad way. The new mode also disables the auto-throttle learning mode that requires the operator to set a full-throttle setting of 1 second on every power-up.

My Little Toni was ready to fly at 9.25 pounds using the 20-cell, 2.75-pound CP2400 Ni-Cd pack.

## IN THE AIR

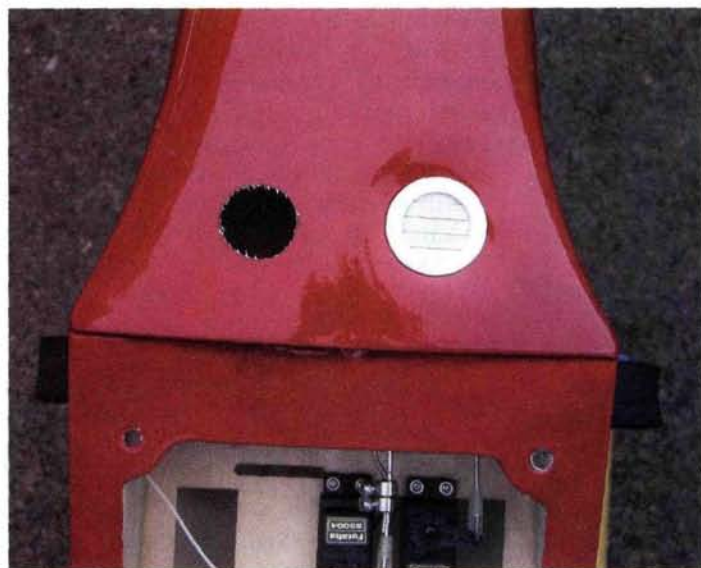
On its first flight, my e-powered Little Toni took off with great authority! The Kontronik 600 power system had more than enough power to make the plane perform aerobatics. With the CP2400 Ni-Cd pack, flights were about 7 to 8 minutes long. We tested the plane for inverted flight, rolls and loops, and we walked away impressed with its performance. The top-end speed was lacking, but the plane performed aerobatics with authority using only 1/2 to 3/4 throttle.



**At 148 ounces and with a 20-cell, 44-ounce CP2400 Ni-Cd pack, my Little Toni was ready to fly.**

Since I measured about 41 amps at full throttle using an APC 14x7 prop, we decided to try an APC 14x10 prop to increase the top-end speed. The current now measured 51 amps, which was still well within the power-system capability. Unfortunately, the Kontronik Jazz-55 ESC was shutting the motor off prematurely. I suspect that the over-current protection kicks in at around 45 to 50 amps instead of at 60 amps. I replaced the controller with a Jeti 77A Opto-Isolated Controller and had no further issues.

The next few flights showed a good improvement in top-end speed. The plane demonstrated excellent slower speed characteristics, and as we became more comfortable with its capability, we could land the Little Toni in only 3/4 of our runway—typical for our other high-performance aerobatic models. The final current draw with the 14x10 prop was 51 amps with 8,500rpm. The power level was just over 1 kilowatt, or 123 watts per pound. No wonder the Little Toni's flight performances are so impressive with this setup!



**An air exit can be installed in the bottom side of the fuselage, just aft of the wing saddle. I used two, 1-inch plastic louvers from a hardware store.**

## SUMMARY

The Kontronik brushless 600 set outperforms the recommended .61 glow engine, while keeping the model clean from fuel residue and safe from vibration. If you're looking for exceptional performance that will keep your scale model looking brand-new for a long time, check out the benefits of electric power! ✈

**APC Props;** distributed by Landing Products (530) 661-0399; [apcprop.com](http://apcprop.com).

**C.B. Associates;** distributed by C.B. Tatone (510) 783-4868.

**ElectriFly;** distributed by Great Planes Model Distributors; [electrifly.com](http://electrifly.com).

**FMA Direct** (800) 343-2934; (301) 668-4280; [fmadirect.com](http://fmadirect.com).

**Futaba Corp. of America;** distributed by Great Planes Model Distributors; [futura-rc.com](http://futura-rc.com).

**Great Planes Model Mfg. Co.;** distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; [greatplanes.com](http://greatplanes.com).

**Jeti;** distributed by Hobby Lobby Intl. (615) 373-1444; [hobby-lobby.com](http://hobby-lobby.com).

**Kontronik;** distributed by Great Planes Model Distributors.

**Kool Flight** (770) 716-7578; [koolflightsystems.com](http://koolflightsystems.com).

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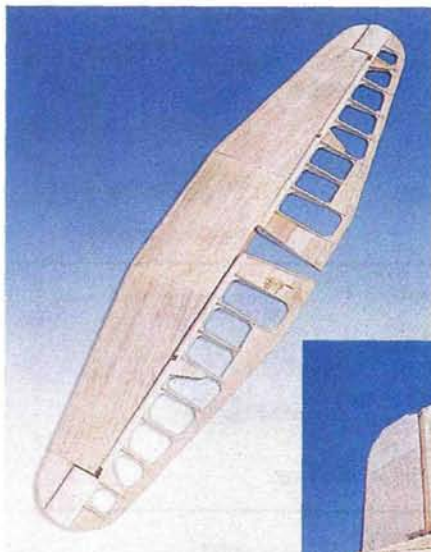
## Getting started in RC scale

**W**hen contemplating building a scale model for the first time, many modelers want to start with a fighter aircraft! Although Mustangs, Spitfires and P-40 Warhawks may seem to be exciting choices, they are hardly good starting points for new scale modelers or fliers. These aircraft have complex structures and less-than-forgiving flight characteristics. The best solution is to choose a warbird that's reasonably easy to build, fits in any midsize car and is not demanding to fly. Enter Brian Taylor's Vought OS2U Kingfisher—a perfect first-time scale project that happens to be a warbird. Let's take a closer look at what it takes to build one.

Originally designed about 20 years ago, Brian's Kingfisher was intended for general use. It has a modestly tapered wing, non-retractable landing gear and a relatively low wing loading—all good points! To minimize the weight even more, flaps have been omitted from the design. With a wingspan of just 58 inches, this model can be powered by any .40-size engine.

### AT THE WORKBENCH

Before you start construction, study the plans carefully, and check the fit of your



**Above:** built using the "half-rib" technique, the completed stabilizer and elevator halves are shown here. Every effort should be taken to minimize weight.

**Right:** here is one wing panel (shown upside-down) with the upper sheeting and the aileron servo already in place. Notice the material removed from the ribs to save weight.



major components. Will the engine fit within the cowl? Does the firewall need to be moved farther aft or forward? Will your engine's fuel tank fit? Check the placement and size of your RC equipment. Consider where you will put the batteries and the switch. Find the best possible place for the servos so the pushrods will be straight. Proper planning here will prevent the irritation (and expense!) of having to rebuild later on.

Note which building materials you will need, and then head to the hobby shop. When building from plans, it is best to cut out all the pieces before you begin to assemble the model; make a kit first and then build it.

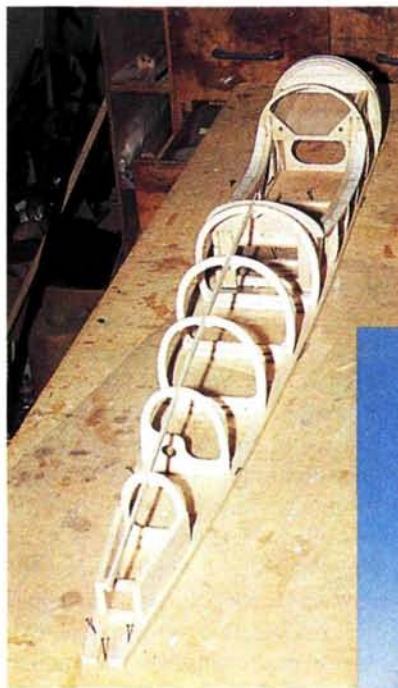
I always start my building with the tail surfaces. This serves as a warmup for the other, larger pieces that need to be built. Built flat over the plans, the tail surfaces use a "half-rib" construction. This produces a perfectly straight structure without your having to make building jigs. Before you join the tail surfaces' upper and lower halves, be sure to install the hinge blocks. I usually use Robart Hinge Points along with Robart Hinge Point Pockets for the fin and stabilizer.

**Wing.** The Kingfisher features a built-up wing, and there are small building tabs underneath each rib to ensure accuracy. I changed Brian's approach slightly and replaced the  $\frac{3}{8}$ -inch-thick balsa leading edge shown on the plans with an  $\frac{1}{8}$ -inch-thick sub-leading edge glued to the front of the ribs, and after I had sheeted the wing, I added a  $\frac{1}{4}$ -inch-thick leading edge.

To produce a good, smooth wing surface, make the wing-sheeting skins in one piece. Tape the  $\frac{1}{16}$ -inch balsa sheets together with masking tape and edge-glue them together with medium CA. Cut the large sheet slightly oversize, and then place it on a flat plywood surface and sand the seams flush using a sanding bar or a small electrical sander. I use Zap CA almost completely throughout the model and Sheet-Zap for ribs and wing sheeting.

Build the ailerons separately (flat on the building board) and fit them to the wing panels. To eliminate the weight and complexity added by bellcranks and linkages, actuate the ailerons with two miniservos built into the wing panels.





**Left:** pinned to the work surface, the lower fuselage half has been built around the main structure. It is now ready to be sheeted with balsa.

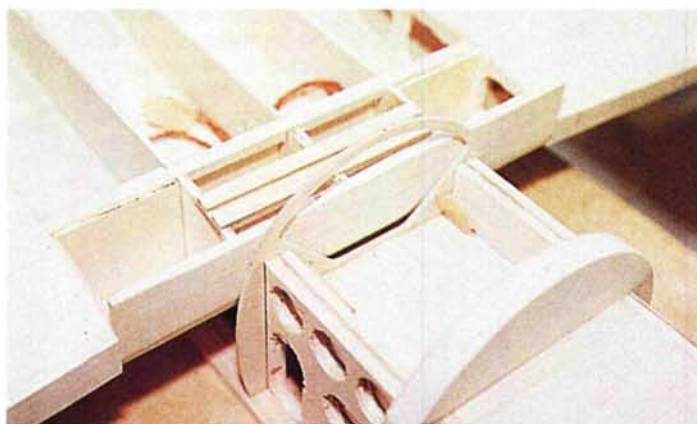
**Below:** constructed of medium-weight balsa and aircraft-grade plywood throughout, this is the basic forward fuselage assembly. Everything else is built around this main structure.



The wing's center section is built separately and houses the landing-gear attachment blocks. The two outer panels are added to it after it has been completed. Fit the "1A" ribs into place after you've

attached the wing to the fuselage; this will allow some fine-tuning of the mating surfaces (in case the parts don't fit together perfectly).

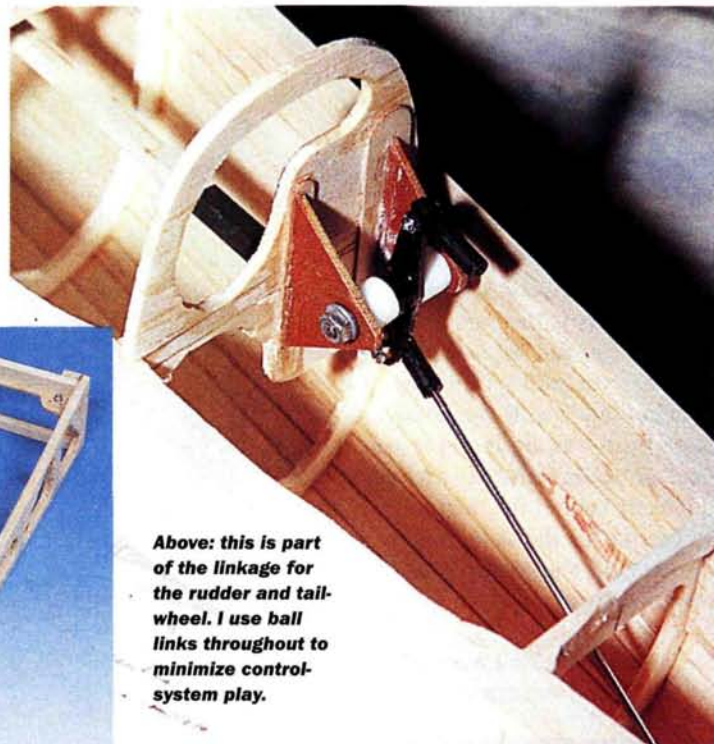
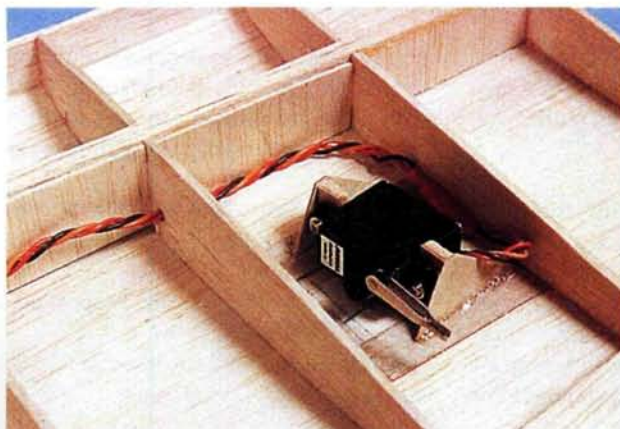
The trailing edge is always fragile and, because of its thin cross-section, prone to warping during construction. I stiffen it by gluing a  $\frac{3}{16}$ -inch-wide strip of  $\frac{1}{4}$ -inch-thick plywood to the upper sheeting before I glue the lower sheeting into place. The trailing



**Above:** here, the wing is being fitted to the fuselage. You can see the ply landing-gear-mount plate.

**Right:** separate aileron servos in the wing panels eliminate the need for complicated bellcrank and linkage setups used with one servo installed in the center of the wing.

**Far right:** I extended the fin's rudder post to the top of the stabilizer for additional strength.



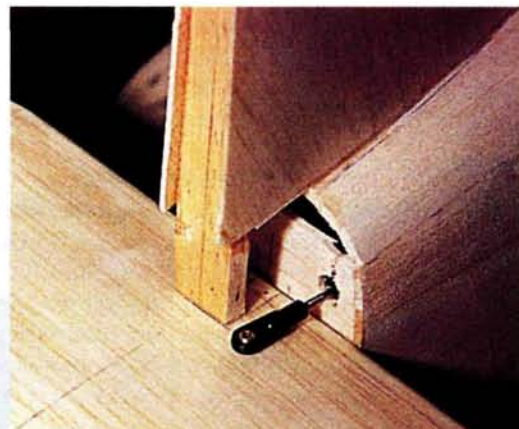
**Above:** this is part of the linkage for the rudder and tail-wheel. I use ball links throughout to minimize control-system play.

edge can then be sanded to a fine point without weakening it.

**Fuselage.** On his plans, Brian shows isometric views of the first three fuselage building stages; they will help you understand how the structures should go together. The main support structure is made of balsa and plywood and houses the engine and fuel tank. All the rest of the fuselage parts are built up around the main structure. Once the stabilizer has been glued into place, the fin can be added. For added strength, I extended the fin post down to the upper side of the stabilizer and glued it there as well. Also note that the fin is offset to compensate for engine torque.

The landing gear looks quite complicated, but it's made of bent piano wire, so it's simple enough to make. The belly pan is built in place and then removed. This allows you to build and finish the belly pan and then remove it to simplify the landing-gear installation. Temporarily install the gear and solder the pieces together. After you've soldered the gear, it can be removed and clad with balsa or a low-density polyurethane modeling foam to produce the scale struts. When the landing gear has been completed, the belly pan is then permanently glued to the wing.

To fly properly, the model's wing incidence has to be set at 1.5 degrees (measured on the wing root). The only way to ensure that you have the correct angle is to check it during construction with





## SCALE TECHNIQUES

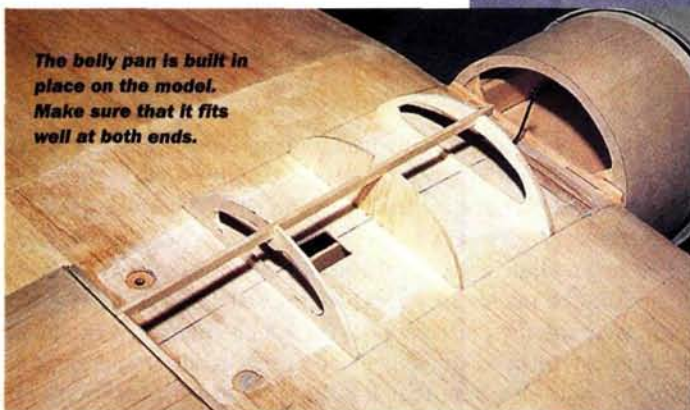
an incidence meter. It's a vital tool for any modeler's workshop.

**Final assembly.** As with all models, make sure that your control linkages are slop-free. I use helicopter-grade ball links throughout the model to ensure a sound linkage system. There are three servos in the fuselage, and because of the model's minimal size and its low flying speed, standard servos with 1/4-inch-square, hard-balsa pushrods are totally acceptable. I used an 1850mAh battery pack and placed it directly behind the firewall. To conceal it, I mounted the radio switch through the firewall, and I reach into the engine cowl to switch it on.

**Finishing.** Because I wanted this model to be a good example of a first scale



*This close-up of the landing gear shows how nice bent-wire gear can look. Note the "exhaust residue" (weathering) on the main strut.*



*The belly pan is built in place on the model. Make sure that it fits well at both ends.*

model, I did not go crazy detailing it. This helps to keep its weight down, and in so doing, improves its flight performance. I covered the entire model with thin fiberglass cloth and epoxy resin. Although this method adds slightly more weight than a tissue and dope finish does, it is much more durable. There is a wide range of Kingfisher color schemes to choose from. I prefer bright colors and markings for maximum visibility. Not surprisingly, camouflage schemes make a model difficult to see in dim light! With its bright prewar colors—silver with dark blue tail surfaces and yellow chrome wings—this Kingfisher is a pleasure to see and to fly.

I did some basic weathering using soft pastels, strongly diluted paint and oil stains, and then I sprayed the entire model with a light coat of semi-matte varnish. This protects the weathering and gives the model a nice, even shine.

### FLYING THE MODEL

I originally used an older O.S. .40 4-stroke, and it fit under the cowl with just a little cheating, but later, I switched to a Laser .70 4-stroke for better performance. Regardless of the engine you choose, make sure that the throttle linkage operates freely and that all the fuel lines are installed and connected properly.

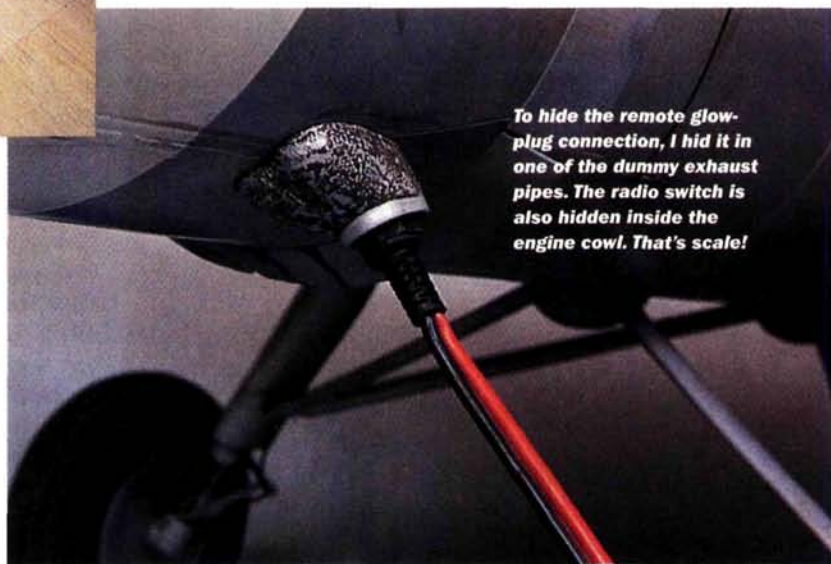
At 6.4 pounds, my Kingfisher ended up well within the green zone, and it's a pleasure to fly. The Laser .70 is at the high end of

the power range, so scale takeoffs are made at about 1/3 throttle. Cruising speed is a few clicks above idle. I have found that the model still requires a bit of right rudder on takeoff, so I'm tempted to give the fin an extra degree or two of additional offset to compensate for this.

As you would expect, the Kingfisher is not suitable for hot aerobatics. It will do all the basic scale figures nicely, but it's at its best when flying low and slow. Perhaps this model's biggest "pro" is that it's so easy and forgiving to fly, even in moderate breezes. Landings are very slow, and three-pointers are possible once you get used to the model. But because of the narrow-track landing gear, even in a slight crosswind, the wingtips may scrape the ground, so be prepared. Practice until you get the hang of it.

### CONCLUSION

Building the Brian Taylor Kingfisher is a pleasant experience that takes relatively little time to complete. My model took about two months to build and one month to finish and detail. I think it's a



*To hide the remote glow-plug connection, I hid it in one of the dummy exhaust pipes. The radio switch is also hidden inside the engine cowl. That's scale!*

perfect project for someone who wants to get his feet wet in scale modeling. For those who want to get further into detailing, the wings, the greenhouse canopies and the landing gear offer many opportunities. Just keep everything reasonably light! ✈

**Brian Taylor Plans;** distributed by Bob Holman Plans Service (909) 885-3959.

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# Classic Model Airplane News

by Rick Bell



... depicted on the December 1954 cover was Jo Kotula's rendering of the Navy's first fighter capable of exceeding Mach 1 in level flight: the Grumman F9F-9 Tiger. Powered by a Wright-built J-65, the jet engine produced 7,220 pounds of thrust without the use of afterburners—quite an accomplishment during the early days of jet propulsion. Jo surely did know how to capture the speed and drama of jet fighters in flight!

... if you were into free-flight (and who wasn't back then?), this issue was a real treat, as it featured plans for Sal Taibi's "Spacer." This impressive design racked up 22 first-place wins in its very first year of competition. No wonder modelers everywhere wanted to build one!

... radio-control models were starting to make the scene, and it's amazing to see how far we've come since then. The "Lazy Bones" was a rudder-only, high-wing model that used a rubber-band-powered escapement to move the rudder, and it needed to be wound before each flight. My, how things have changed!

... in the December 1979 issue, the recurring column "Golden Oldie" featured a construction reprint article from a previous issue—in this case, the spotlight was on a 1939 article about free-flight designer Chester Lanzo and his rubber-powered "Puss Moth."

... stepping back further in time, WW I was relived at the Old Rhinebeck Aerodrome with the 13th annual R/C Jamboree. The event boasted 113 pilots who flew more than 800 sorties during the weekend. The Jamboree still takes place every September and has become a tradition for many modelers.

... the pages of *Model Airplane News* also contained four construction articles, two "Field & Bench" reviews, free-flight, control-line, soaring and plenty of engine info. New on the scene was coverage of the 2nd World R/C Car Championship held in Geneva, Switzerland. Things were really hopping in '79!

## 10 years ago ...



... a spectacular flight shot of the latest hot-rod of the aerobatic world, the Carl Goldberg Sukhoi SU-26, graced the December 1994 cover. The big feature, though, was the "Get started in R/C Buyers' Guide." This 18-page article highlighted everything needed to get started in this rewarding hobby. Planes, helicopters, accessories, building materials, radios, engines and everything in between were highlighted in this comprehensive guide.

... for artistic readers, the long-awaited winners of the MonoKote Design contest were revealed. There were more than 900 entries, and we would have had trouble judging this contest, as there were many deserving models. MonoKote guru Faye Stilley was among the judges, and he provided commentary about the winning entries.

... to show how far radio-controlled models had advanced, RC pioneer Hal deBolt gave an overview of the early years of multi-channel RC equipment. It was a fascinating article that reminisced about the radio systems that modelers in previous years had to deal with. A "simple" 4-channel outfit consisted of four receivers assembled on one common board and four antennas that ran in four directions to minimize interference. The pioneers really went to great lengths to reach their goals! ✚





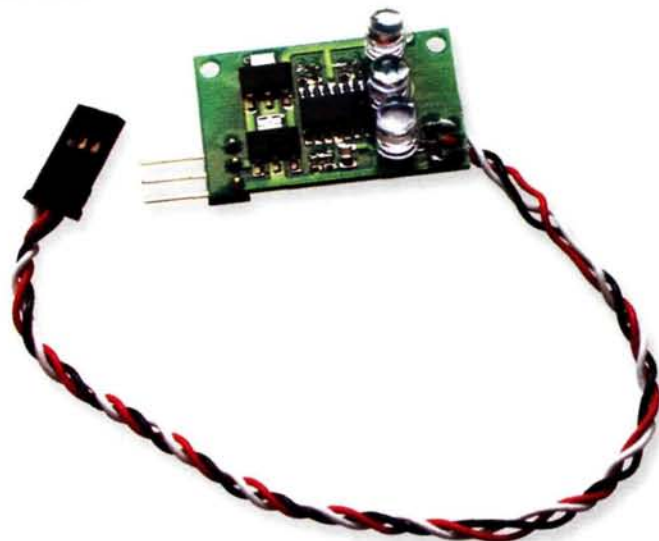
**AT MODEL AIRPLANE NEWS,** we not only tell you what's new, but we also try it out first so we can bring you mini-reviews of the stuff we like best. Manufacturers frequently send us their latest support equipment, and if we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."

## FMA Direct Sport VRLI Li-poly power for glow-powered planes!

With all the talk about Li-poly batteries and their advantages for electric-powered flight, you may have wondered whether they can be used for onboard RC systems as well. Because Li-polys have a characteristic voltage of 3.7 per cell, a single cell would not provide enough voltage to reliably operate most RC airborne systems (receiver and servos). Two Li-poly cells in series produce 7.4 volts nominal, which is too much for the average RC system. Enter FMA Direct's new add-on: the Sport VRLI (voltage regulator and LED indicator). At just 1.25x0.75x0.5 inches and weighing only 0.18 ounce with the connector, this unit allows you to use Li-polys to power your airborne RC system. It costs \$21.95.

The VRLI reduces the higher voltage of two Li-poly cells (upward of 7.4 volts) to a regulated 5 volts, which is most suitable for operating the average RC airborne system. To set it up, plug the cable that exits the VRLI into your RC receiver, and plug the 2-cell Li-poly battery into the switch harness. The output of that switch harness plugs into a connector that's attached to the VRLI PC board. The regulated voltage can tolerate 2 amps of current on a continuous basis. It is claimed to be enough current to power up to five average-output servos and an RC receiver, but please don't consider using it for high-torque (high-output) servos or even digital servos. The VRLI's three LEDs (yellow, green and red) also indicate charge status—a plus for overall operation.

Half-amp and smaller glow-powered planes, hand-launched gliders and small sailplanes can all benefit from Li-poly power. Let me give you some examples to prove this point. A 4-cell, 150mAh Ni-Cd pack weighs 1.4 ounces, but a 2-cell, 145mAh Li-poly pack and VRLI weigh 0.48 ounce. That means you can get the same capacity (145 versus 150mAh) for about an ounce less! If you use a 4-cell, 50mAh Ni-Cd pack that weighs 0.6 ounce, you could get three times the



capacity (145 versus 50mAh) at a still slightly lower weight of 0.48 ounce! Even that tiny decrease on a 1/2A model or a hand-launch glider could be significant.

There are several other advantages to using a Li-poly. The thin profile allows the battery to fit into very narrow (streamlined!) fuselage structures. The battery also has such an excellent shelf life that it would be ready for months on end to be used for a quick flying session (during 6 months, it will lose only a few percent of its charge).

If you have an application for a lightweight RC airborne battery with a greater than average capacity, the use of Li-poly batteries might be worth exploring. Keep them in mind the next time you consider your battery needs for a small, glow-powered model aircraft or for an equally small RC sailplane! —Bob Aberle

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I really enjoy using this stand, and I take it with me whenever I go flying. If you have been looking for a great support system to elevate your model while your work on it, look no further. —Gerry Yarrish  
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# RC UNIVERSITY

*Cal Poly professor gives new meaning to "higher learning"*

**A**fter 20 years as a rocket scientist at Boeing, I decided to begin a new career as a professor of aerospace engineering at California State Polytechnic University in Pomona (aka Cal Poly Pomona). As a professor there, I teach a number of courses, from the freshman-level Introduction to Aerospace 101 (yes, that's really the course title!) to the capstone Aerospace Vehicle Design course for graduating seniors. While I was at Boeing, some of my pet peeves were that quite a few engineers didn't really have practical experience, and that others didn't have a good "feel" for what they were designing or analyzing. Since Cal Poly's motto is "Learn by doing," what better way to get hands-on experience than to actually build and fly (and crash and repair!) a model aircraft?

So I instituted an activity in the Aero 101 class to assemble, measure and test-fly an RC airplane and then write a report on it. I divided the class into teams of four students and provided each team with a GWS Pico Stick model kit, a Hitec or GWS RC system, assembly tools, a list of engineering items to measure (using a gram scale, a tape measure and a stopwatch) and the requirements for an engineering report. Each student



Some of the 90-plus members of the freshman Aerospace 101 class at Cal Poly Pomona pose with their RC models before flying them in the university gym. At the far left in the back, author Don Edberg holds an IFO.

then analyzed the model's flight and determined whether his or her calculations made sense.

Last year, 24 student teams spent one class session putting their aircraft together and measuring the plane's characteristics, such as mass, wingspan, chord, area, center of gravity and propeller pitch/diameter. The next class session was reserved for flight tests. The students went out to the Cal Poly "engineering meadow," a grassy area near the school's engineering buildings, where each team plotted a course on the ground. The students then attempted to fly their planes back and forth on the course while timing the flights to obtain the average flying speeds. The more ambitious students calculated the wind speed as well. (Note: you can calculate both model and wind speed by measuring upwind and downwind times on a known course length; email me at [dedberg@csupomona.edu](mailto:dedberg@csupomona.edu) for the equation.)

Some aircraft flew so well that team members were able to pilot them without assistance, and I managed to correct a

few that weren't properly trimmed before the inevitable impact. Some unlucky teams ended their flights in the trees surrounding the meadow, but all were able to eventually recover their aircraft. I reserved the gymnasium for some indoor flying as well, but although the students didn't need to worry about winds or trees, they did have to worry about flying into walls!

After the flight activities, each student reported on the performance of his or her team's aircraft. The report included all of the measurements and calculations, along with a description of how well the plane flew and why there might be some errors in the analysis or in the tests (what went wrong—and why—is probably the most important part of engineering!).

Last, there was the issue of which student would get to keep the aircraft. Each team made its own arrangement, but in most cases, one of the team members bought out the other three so that he or she could own the plane outright. (Some new modelers in the making?)

Was this a success? Absolutely! As these students continue to learn aerospace engineering, they'll already have actual experience with aerodynamics, structures, controls, propulsion and stability—not bad for a freshman class.

*Editors' note: Don has established a model airplane laboratory for student research on unmanned aerial vehicles (UAVs), and he would welcome donations of surplus RC gear and materials. Those interested may contact him at [dedberg@csupomona.edu](mailto:dedberg@csupomona.edu). ✦*



Above: a student team prepares its model for flight around the closed course. None of the teams has flown a model through the building's triangle—yet! Right: Don explains how to use the trim tabs on the transmitter to adjust control positions.

